Flora of Chiapas

PUBLISHED BY THE CALIFORNIA ACADEMY OF SCIENCES

Part 6

ACTINIDIACEAE: ***Barbara T. Keller***
GARRYACEAE: ***Thomas F. Daniel***
KRAMERIACEAE: ***Thomas F. Daniel***
STYRACACEAE: ***Peter W. Fritsch***
SYMPLOCACEAE: ***Lawrence M. Kelly and Frank Almeda***

Thomas F. Daniel, Editor
Department of Botany
California Academy of Sciences

October 15, 2005

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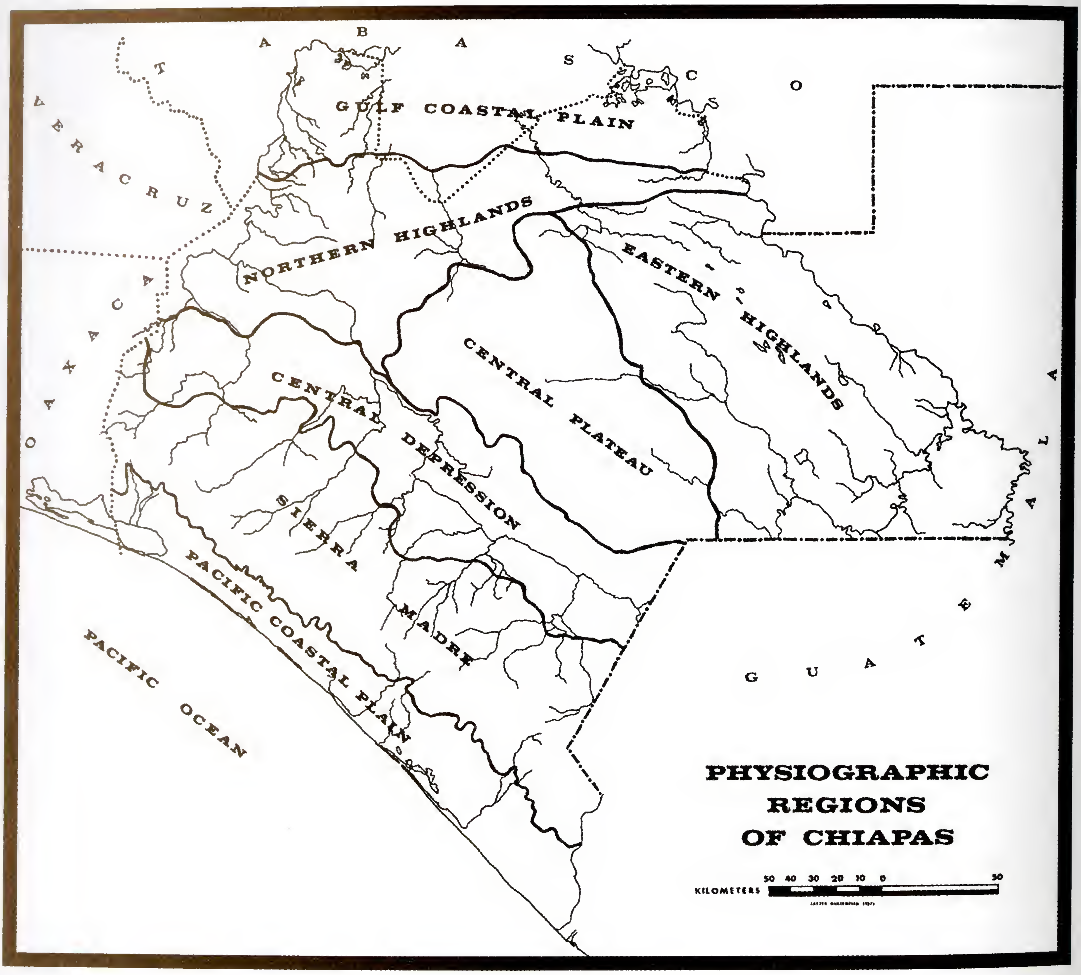

MAP 1. Physiographic regions of Chiapas, Mexico (after Müllerried, 1957)

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Alan E. Leviton, Editor
Gary C. Williams, Associate Editor
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EDITOR'S PREFACE

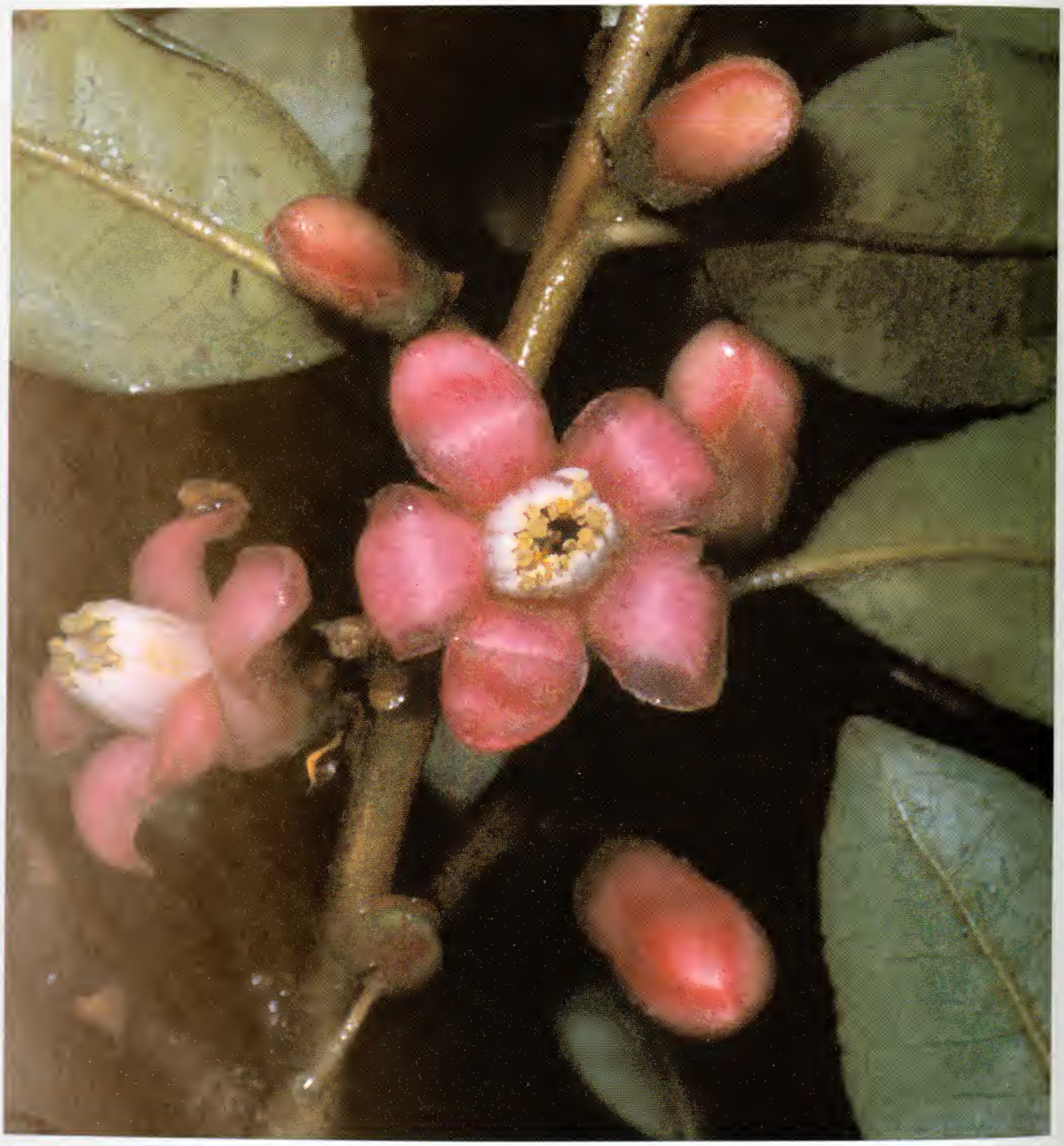
Part 6 of the *Flora of Chiapas* is the first publication in the series that contains accounts of more than a single family (Part 2 did not treat genera of pteridophytes within families). This permits the timely publication of several smaller families that have been prepared for the *Flora*. An account for each of these five families is presented in its entirety by one or more specialists familiar with the plants in southern Mexico. Treatments for at least four other families, large and small, are being prepared for future parts of the *Flora*.

The *Flora of Chiapas* was the creation of Dennis Breedlove, curator of botany at the Academy from 1969 to 1994. His invaluable collections from throughout that Mexican state remain the major source of information for the project. The Chiapan collection at the Academy consists of approximately 70,000 specimens. A database of them that includes information on taxa, collector, date of collection, locality (including municipio), habitat, and elevation may be searched at the Academy's web site: <*http://www.calacademy.org/research/botany/aboutchiapas.html*>.

Although I continue to serve as editor of the series, the onerous tasks of formatting the text and seeing it through to publication are undertaken by the most capable of editors, Alan E. Leviton, editor of scientific publications at the Academy. It is largely due to his efforts that the *Flora of Chiapas* continues to be published. All authors of Part 6 are especially grateful for his devotion and generosity to the project.

Thomas F. Daniel
Department of Botany
California Academy of Sciences
24 June 2005

ACTINIDIACEAE
GARRYACEAE
KRAMERIACEAE
STYRACACEAE
SYMPLOCACEAE



FRONTISPIECE. *Symplocos hartwegii* (*Kelly et al. 1339*) from Cerro Mozotal.
Photograph by Frank Almeda.

ACTINIDIACEAE

Barbara T. Keller

UC Botanical Garden
200 Centennial Drive #5045
Berkeley, CA 94720-5045

Trees, shrubs, or woody vines; leaves alternate, simple; stipules wanting; inflorescences axillary or lateral, cymose or paniculate; flowers radially symmetrical, bisexual or unisexual (plants then dioecious), mostly pentamerous; aestivation quincuncial; calyx imbricated; corolla imbricated; stamens indefinite in number, hypogynous, often adnate to bases of petals; anthers dithecal, versatile, dehiscing longitudinally or by apical pores; ovary superior, 3–many-locular, with free styles as many as locules; ovules many in each locule, axile, anatropous, with a single integument; fruit a berry; seeds non-arillate with abundant endosperm; embryo usually large.

The Actinidiaceae have been placed at various times in the Theales and Dilleniales, but currently, although phylogenetic relationships within the order are not well understood, the Actinidiaceae is thought to be part of the core Ericales. The family consists of three genera, *Actinidia*, *Clematoclethra*, and *Saurauia*. It ranges from high elevations to lowlands in both the eastern and western hemispheres. Members of *Actinidia* and *Clematoclethra* are eastern hemisphere plants. *Saurauia* is found in both the eastern and western hemispheres.

Actinidia deliciosa and *A. arguta* (Chinese gooseberry, kiwi fruit) are widely cultivated for their delicious fruits. Fruits of *Saurauia* are also eaten by local people and the trunks of *S. oreophila* and *S. scabrida* are used as wall poles and fence rails in Chiapas. Members of all three genera are cultivated as ornamentals.

Acknowledgments

I would like to thank the curators of the following herbaria for providing specimens used in this study: A, BM, CAS, DS, F, G, GH, K, MICH, MO, NY, P, SMU, UC, US. Many thanks to the reviewers for their helpful comments and suggestions. I am grateful for the advice and editing expertise of Tom Daniel, curator of botany at the California Academy of Sciences, without whose patience this paper would not have been published. I would like to thank Terry Bell for his precise and beautiful drawing. And last, I would like to thank Dennis Breedlove for his help, encouragement, opportunity to travel and study *Saurauia* in the wild, and for suggesting the project to me.

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SAURAUIA

Saurauia Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3:407, t. 4. 1801.—TYPE: *Saurauia excelsa* Willd.

Scapha Noronha, Verh. Batav. Genootssh. Kunsten 5, ed. 1, Art. 4:3. 1790, nom. nud.

Palaua Ruiz & Pav., Fl. Peruv. Prodr. 100. 1794, non Cav. (1785). Apetelia DC., Mém. Soc. Phys. Genève 1:426. 1821.—TYPE: *Palaua lanceolata* Ruiz & Pav.

Leucothea Moc. & Sessé ex DC., Mém. Soc. Phys. Genève 1:419. 1821, nom. nud.

Vanalphimia Lech. ex DC., Mém. Soc. Phys. Genève 1:419. 1821, nom. nud.

Marumia Reinw. ex Blume, Catalogus 79. 1823.—TYPE: *Marumia cauliflora* Reinw. ex Blume.

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Reinwardtia Blume ex Nees, Syll. Pl. Nov. 1:196. 1824, non Dum. (1822). *Blumia* Spreng. in Linnaeus, Syst. Veg., ed. 16, 3:126. 1826.—TYPE: *Reinwardtia javanica* Blume ex Nees.

Tonshia Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 225. 1825.—TYPE: *Tonshia polypetala* Buch.-Ham. ex D. Don.

Overstratia Deschamps, Benn. Pl. Jav. Rar. 171. 1840, nom. nud.

Obelanthera Turcz., Bull. Soc. Imp. Naturalistes Moscou 20(1):148. 1847.—TYPE: *Obelanthera melastomacea* Turcz.

Draytonia A. Gray, U.S. Expl. Exped., Phan. 1838–42 (Wilkes) 15:206, t.15. 1854.—TYPE: *Draytonia rubicunda* A. Gray

Synarrhena F. Muell., Fragm.5:175. 1866, nom. nud.

Trematanthera F. Muell., Victoria Naturalist 3:71. 1886.—TYPE: *Trematanthera dufaurii* F. Muell.

Pubescent, soft-wooded trees and shrubs; leaves simple, spiral, penninerved, reticulately veined; inflorescence a panicle of cymes, axillary; flowers perfect, regular, mostly pentamerous (tetramerous in S. yasicae), bracteolate; sepals 3–6, usually 5, fused at base, persistent, strongly imbricated in bud, two outer sepals exposed in bud, two inner sepals exposed medially, imbricated laterally in bud, and one sepal half exposed and half imbricated in bud, margins usually ciliolate; petals 3–6, usually 5, white or pink, obovate, rounded or emarginate at apex, fused at base; stamens, adnate to base of corolla, filiform, pubescent at base, anthers bifurcate, versatile, extrorse, basally dehiscent by pores; ovary superior, globose, 3–6 locular, sulcate, styles obsolete to exceeding androecium in height, seeds many, small, globose to irregularly angular, areolate, embedded in mucilaginous pulp, embryo straight, one third to one half as long as the seed, endosperm copious, mealy.

Saurauia, a genus of about 300 species (Pool 2001), occurs in both the Old World and New World tropics. In the western hemisphere it ranges from San Luis Potosí, Mexico in the north to Bolivia in the south. Plants occur in humid or wet habitats (typically in cloud forest or rain forest) along streams, gullies, and ravines. Forty-nine species are reported in South America (Soejarto 1980) and 28 in Central America (Hunter 1966; Keller & Breedlove 1981; Pool 2001; Soejarto 1984). Fifteen species occur in Chiapas, and two of them are endemic there.

In this treatment as well as in those presented by Hunter (1966) and Soejarto (1980), the type and distribution of trichomes on sepals and leaves are important characters in the key. Pubescence and trichome terminology used in this paper follows that of Hunter (1966) in his revision of the Central American species of *Saurauia*.

Key to the species of *Saurauia* in Chiapas

a. Sepal surface imbricated in bud pubescent to the margin.

b. Tertiary veins immersed; lower leaf surface glabrous.

c. Leaves pustulate; sepal surface exposed in bud sparsely to abundantly strigillose and stellate-pubescent .... 9. *S. pustulata*

cc. Leaves smooth, not pustulate; sepal surface exposed in bud glabrous or sparsely stellate-pubescent (rarely with sparse stellate and basally plumulose-strigillose trichomes) .... 4. *S. kegeliana*

bb. Tertiary veins raised; lower leaf surface stellate-pubescent.

d. Leaves floccose in axils of secondary veins; inflorescence 50–100-flowered; sepals strigose and stellate-pubescent without, subapically pubescent within .... 11. *S. scabrida*

dd. Leaves not floccose in axils of secondary veins; inflorescence 7–30-flowered; sepals setose or hirsute and stellate-pubescent without, densely pubescent almost to the base within.

e. Lower leaf surface densely white stellate-pubescent and hirsutellous, the trichomes obscuring the surface; sepals 7–11 mm long, 5–9 mm wide, densely loriform and sericeous, trichomes 2–4 mm long .... 13. *S. villosa*

ee. Lower leaf surface sparsely stellate-pubescent; sepals 6–7 mm long, 4–5 mm wide, setose and stellate-pubescent, trichomes not more than 1.8 mm long .... 10. *S. rubiformis*

aa. Sepal surface imbricated in bud glabrous (only submarginally glabrous in S. scabrida)

f. Sepals 4 .... 14. *S. yasicae*

ff. Sepals 5.

g. Lower leaf surface stellate-pubescent.

h. Sepal surface imbricated in bud only submarginally glabrous, stellate and radiate trichomes present on remaining imbricated area of sepal; upper leaf surface strigose-papillose, the trichomes often with pale swollen bases .... 11. *S. scabrida*

hh. Sepal surface imbricated in bud glabrous; upper leaf surface not strigose, trichomes hirtellous or setulose.

i. Leaves mostly less than 17 cm long, chartaceous .... 8. *S. oreophila*

ii. Leaves mostly more than 17 cm long, chartaceous to coriaceous.

j. Sepal surface exposed in bud densely plumulose-strigose, the trichomes appearing thick and fusiform, rusty-brown; outer and imbricate sepals subapically pubescent within in flowering material; leaves obovate to broadly obovate .... 2. *S. aspera*

jj. Sepal surface exposed in bud hirsute- and stellate-pubescent; all sepals glabrous within; leaves narrowly to broadly elliptic, narrowly oblong, or obovate.

k. Leaves coriaceous to subcoriaceous; lower leaf surface stellate-pubescent to abundantly stellate-pubescent (never densely stellate-pubescent); hirsutellous on major veins .... 6. *S. madrensis*

kk. Leaves subcoriaceous to chartaceous; lower leaf surface with loriform trichomes or hirsute on major veins, sparsely to densely stellate-pubescent between veins .... 12. *S. selerorum*

gg. Lower leaf surface not stellate-pubescent. (rarely sparsely stellate-pubescent near primary vein in *S. aspera*)

l. Lower leaf surface mostly glabrous or sparsely strigillose on major veins.

m. Tertiary veins immersed.

n. Flowers 7–11(15) mm broad; sepals 1.9–3(5) mm long .... 5. *S. leucocarpa*

nn. Flowers 15–22 mm broad; sepals 5–10 mm long .... 4. *S. kegeliana*

mm. Tertiary veins raised.

o. Leaves chartaceous (rarely subcoriaceous), less than 7 cm wide; sepal surface exposed in bud glabrous or sparsely strigillose; stamens 22–28, filaments 1.5–2.5 mm long; Northern Highlands and Central Plateau .... 1. *S. angustifolia*

oo. Leaves coriaceous, more than 7 cm wide; sepal surface exposed in bud hirtellous and stellate-pubescent; stamens 29–33, filaments 2.4–2.8 mm long ; Central Plateau (Lagos de Montebello) .... 15. *S. zahlbruckneri*

ll. Lower leaf surface hirsute, sericeous, or setose.
  p. Leaves coriaceous; sepal surface exposed in bud densely plumulose-hirsute, trichomes about 2 mm long, soft and flexuous; lower leaf surface sericeous, soft to the touch . . . . .3. *S. cuchumatanensis*
  pp. Leaves chartaceous or subcoriaceous; sepal surface exposed in bud strigose or long setose, trichomes not soft and flexuous; lower leaf surface neither sericeous nor soft to the touch.
    q. Leaves floccose in axils of secondary veins; sepal surface exposed in bud with dense plumulose-strigose and radiate trichomes less than 2 mm long; lower leaf surface hirsute; Northern Highlands, Eastern Highlands, and common in Sierra Madre . . . . .2. *S. aspera*
    qq. Leaves not floccose in axils of secondary veins; sepal surface exposed in bud hirsute to long setose and paleaceous, trichomes about 2–3 mm long; lower leaf surface with long (3–6 mm long) setose trichomes on major veins, glabrous between veins; rare in Sierra Madre . . . . .7. *S. matudae*

1. Saurauia angustifolia Turcz., Bull. Soc. Imp. Naturalistes Moscou 31(1):242. 1858.

—*Saurauia leucocarpa* Schltdl. var. *angustifolia* (Turcz.) Buscal., Malpighia 29:112. 1921.—TYPE: Mexico, Oaxaca, Sierra de San Pedro Nolasco, Talea, etc., *Jurgensen 898* ("Erb. di Lipsia" [fide protologue]; isotypes: BM!, F!, G!, K!).

Saurauia anisopoda Turcz., Bull. Soc. Imp. Naturalistes Moscou 31(1):242. 1858.—*Saurauia leucocarpa* Schltdl. var. *anisopoda* (Turcz.) Buscal., Malpighia 29:107. 1921.—SYNTYPES: Mexico, Oaxaca, without precise locality, *Galeotti 4198* (F! fragment, G!, P!).

Saurauia leucocarpa Schltdl. var. *stenophylla* Buscal., Malpighia 29:104. 1921.—LECTOTYPE (here chosen): Guatemala, Alta Verapaz, Tactic, *von Turckheim 8380* (F!; isolectotypes: GH!, NY!, US!).

ILLUSTRATIONS: De Vriese, Pl. Ind. Bot. Or. It., 3. 1856; Beccari, Foreste Borneo, 403. 1902.

Shrubs and small trees to 8 m tall, pubescent; branchlets pale-strigose or villous at growing tips, bark grey-brown to light brown, irregularly fissured or wrinkled; leaves chartaceous, olivaceous to brown when dry, darker above than below, narrowly obovate to narrowly elliptic, 4.5–20 (–24) cm long, 2–6(–7) cm wide, apex acute to acuminate, base acute to obtuse or rounded, margins serrate to setaceo-serrulate; upper and lower leaf surfaces mostly glabrous, young leaves scattered strigillose or setose on veins, floccose or not in axils of secondary veins; secondary veins 9–12 pairs, tertiary veins elevated, more prominent than lesser venation; petioles 0.8–3.5 cm long, 1–2 mm wide, strigose to abundantly strigose; inflorescence 5–35-flowered, 4–14 cm long, 4–8 cm wide; peduncle 22–75 mm long, 0.48–1.5 mm in diameter, scattered strigillose, trichomes flexuous at tips; bracts linear to narrowly oblanceolate, glabrous to sparsely strigillose, 3–9 mm long; flowers 10–17 mm broad, buds 2–4 mm in diameter, pedicels 4–17 mm long, glabrous to sparsely strigillose; sepals 5, 4–7 mm long, 2–7 mm wide, rotund, sepal surfaces exposed in bud glabrous to sparsely strigillose or hirsutellous, surfaces imbricated in bud glabrous, all sepals glabrous within, ciliate; petals 5, white, 6–7 mm long, 2–6 mm wide; stamens 19–28, filaments 1.5–2.5 mm long, anthers 1.5–2.5 mm long; ovary glabrous, styles 3–5 mm long; fruit 8–15 mm in diameter. Flowering Jun–Aug.

Montane Rain Forest and Evergreen Cloud Forest; common in Northern Highlands and Central Plateau; 1380–2700 m. Southern Mex. (Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *EL 7489* (DS); *EM 4073* (A, DS, MICH, NY); *EM 15444* (F); *GS 160* (CAS); *12685; 21490; 26771; 29194; 33562; 41068; 47852; 52092; 53223; 55694; 55962; 57114.*

2. Saurauia aspera Turcz., Bull. Soc. Imp. Naturalistes Moscou 31(1):242. 1858.

—*Saurauia aspera* f. *delessertiana* Buscal., Malpighia 27:303. 1916.—TYPE: Mexico, Oaxaca, without precise locality, *Galeotti 7235* (LECB; isotypes: P!, US!).

Saurauia englesingii Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 4:233. 1929.—TYPE: Nicaragua, region of Bragman's Bluff, *Englesing 281* (F!; isotypes: A!, K!, G!, GH!, NY!).

Saurauia perseifolia Standl. & Steyerm., Field Mus. Nat. Hist., Bot. Ser. 23:216. 1947.—TYPE: Guatemala, Isabal, Río Temeja, Cerro San Gil, *Steyermark 41784* (F!).

ILLUSTRATIONS: none found.

Trees and shrubs 4.5–9 m tall, abundantly pubescent with short golden-brown or rusty-brown trichomes; branchlets dull dark brown, sulcate, with abundant to dense strigose and minute appressed trichomes; leaves chartaceous to subcoriaceous, dark green to brown above when dry, lighter below, obovate to broadly obovate, rarely elliptic, convex when fresh, 9.5–34 cm long, 4–16 cm wide, apex acute, acuminate, or obtuse, base obtuse to rounded, margin serrulate to setaceo-serrate; upper leaf surface short-setose, hirsute on midvein, lower leaf surface abundantly short-hirsute or setose with trichomes usually 1 mm long or shorter, rarely stellate-pubescent between veins, floccose in axils of secondary veins, abundantly to densely plumose-strigillose on primary veins; secondary veins 15–25 pairs, tertiary veins raised, more prominent than lesser venation; petioles 1.4–4(–5) cm long, 2–3 mm in diameter with abundant to dense plumulose-strigose trichomes mixed with tufted and pulverulent types; inflorescence 30–100-flowered, 7–24 cm long, 6–12 cm wide; peduncle 4.5–11 cm long, 1.5–3.5 mm in diameter, abundantly to densely pubescent with plumulose-strigose and tufted trichomes; bracts linear to triangular, densely plumulose-strigillose, 2–6 mm long, 1–2 mm wide; flowers 7–14(16) mm broad, buds 2.5–5 mm in diameter, pedicels abundantly to densely plumulose-hirtellous or plumulose-strigillose, 2.5–8(10) mm long, 0.5–1 mm wide; sepals 5, 4–6 mm long, 2–4 mm wide, apex of outer sepals acute, inner and imbricate sepals rounded, sepal surfaces exposed in bud densely plumulose-strigose (trichomes appearing somewhat triangular), and with radiate and tufted types, trichomes rust-colored, surfaces imbricated in bud glabrous, outer and imbricate sepals subapically pubescent within, inner sepals glabrous within, ciliate; petals 5, white to pink, 3–8.5 mm long, 4–5 mm wide; stamens 27–35, filaments 2–4 mm long, anthers 1.5–2 mm long; ovary glabrous, styles 5, 4–6 mm long or obsolete; fruit 6–8 mm in diameter when dry. Flowering Jul–Dec.

Slopes, along streams and marshy ground in Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, and Evergreen Seasonal Forest; common in Northern Highlands, Eastern Highlands, and Sierra Madre; 180–1324 m. Mex. (Ver., Oax.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *EM 0642* (A, F, MICH, MO, NY, US); *EM 16809* (DS, F, MICH, NY); *R&R&M 1423* (DS, F); *13640; 20966; 22193; 26433; 30679; 38148; 45908; 49401; 49397; 49478; 56097.*

Saurauia aspera Turcz. is distinguished by its ochraceous or rusty-brown trichomes, the short setose trichomes on the underside of the leaves, and (in fresh material) by the reflexed sepals in fruit. It can be easily distinguished from *S. scabrida* by the lack of stellate trichomes on the underside of the leaves and convex (vs. plane) leaves.

3. **Saurauia cuchumatanensis** Standl. & Steyerm., Field Mus. Nat. Hist., Bot. Ser. 23:215. 1947.

—TYPE: Guatemala, Huehuetenango, Cruz de Limón between San Mateo Ixtatan and Nuca, Sierra de los Cuchumatanes, *Steyermark 49810* (F!).

ILLUSTRATION: none found.

Shrubs and trees to 9 m tall; branchlets abundantly coarse hirsute to appressed paleaceous-setose, bark brown to dark brown, wrinkled; leaves coriaceous, gray-green to rusty-brown above when dry, rusty brown or dark olive green below, narrowly to broadly elliptic to narrowly obovate, (5)7.5–24 cm long, (2.5)3.5–11.7 cm wide, apex acute, apiculate or obtuse, base acute, truncate, or subcordate, sometimes oblique, margin serrulate to coarsely serrate; upper leaf surface scabrous with sparse hirsute trichomes, lower surface sericeous with dense or abundant long rusty trichomes to 3.3 mm long, villous in axils of secondary veins; secondary veins 12–22 pairs, tertiary veins elevated, more prominent than lesser venation; petioles 8–25(–45) mm long, 2–4 mm in diameter; inflorescence 10–32(–50) flowered, 6–14(–28) cm long, 3–8(–12) cm wide, densely brown-hirsute or setose; peduncle 1.1–6(–11) cm long, 2–4 mm in diameter, spreading-hirsute; bracts linear, 3–10 mm long, dense hirsute; flowers 15–23 mm broad, buds 5–9 mm in diameter, pedicels 2–10(–19) mm long, 1.5–2 mm wide, densely rusty-hirsute; sepals 5, 5–8 mm long, outer sepals broadly elliptic, 3–6 mm wide, thick and succulent, inner sepals rotund, 4–7 mm wide, thick medially, much thinner laterally, sepal surfaces exposed in bud densely rusty plumulose-hirsute, trichomes about 2 mm long, surfaces imbricated in bud glabrous, all sepals glabrous within, ciliate; petals 5 white, 6–12 mm long, 6–8 mm wide; stamens 18–38, filaments 2–2.4 mm long, anthers 2.2–2.8 mm long; ovary glabrous, styles 5, 0.5–5 mm long; fruit 6–15 mm in diameter when dry. Flowering Sep–Feb.

Slopes in Montane Rain Forest and Evergreen Cloud Forest; common in Eastern Highlands; 800–2300 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Dr 1464* (MICH, NY, US); *PM 66* (CAS); *15643; 21167; 29844; 33506; 36920; 41047; 47820; 47844; 47875; 49384; 49385; 49596; 53182; 55675; 56189; 57111; 66225.*

Saurauia cucumatanensis and *S. matudae*, though widely separated geographically in Chiapas, are closely related to each other and to *S. conzattii*, a Oaxacan species. Hunter (1966) treated the three as synonymous under the name *S. conzattii*. There are some apparent differences in the three, and I choose to treat them here as separate species.

4. **Saurauia kegeliana** Schltdl., Bot. Zeitung (Berlin) 11:694. 1853.

—TYPE: not designated. The species was described from plants cultivated at Halle, Germany that grew from seeds in soil around plants imported from Guatemala.

Saurauia pauciserrata Hemsl., Diagn. Pl. Nov. 1:3. 1878.—TYPE: Guatemala, Sacatepéques, Volcán de Fuego, *Salvin s.n.* (K!).

Saurauia pauciserrata var. *kegeliana* (Schltdl.) Buscal., Malpighia 25:13. 1912, nom. nud.

Saurauia pauciserrata f. *kegeliana* (Schltdl.) Buscal., Malpighia 29:7. 1912.—SYNTYPES: Guatemala, Santa Rosa, Teocinte, *Heyde & Lux 4328* (B, F!, K!, G!, GH!, MICH!, MO!, US!); Guatemala, Los Positos, *Bernoulli & Cario 3066* (GUAT ?); Guatemala, without precise locality, *Heyde 580* (US); Guatemala, Sacatepéquez, Volcán de Fuego, *Donnell Smith 1453* (GH!, K!, US!).

Saurauia maxonii Donn. Sm., Bot. Gaz. (Crawfordsville) 42:292. 1906.—TYPE: Guatemala, Alta Verapaz, Secanquim, *Maxon & Hay 3221* (US!).

Saurauia pauciserrata f. *crenata* Buscal., Malpighia 29:11. 1921.—LECTOTYPE (here chosen): Guatemala, without precise locality, *Bernoulli & Cario 3347* (K!).

Saurauia intermedia Buscal., Malpighia 29:23. 1921.—TYPE: Guatemala, Barranca de Pinula, *S. Skinner s.n.* (K).

ILLUSTRATION: Hemsley, Biol. Centr. Amer. 5:t.7. 1878.

Trees and shrubs (4–) 6–20 m tall; branchlets glabrous to sparsely stellate-pubescent and strigillose near apex of stem, bark grey-brown to light brown, furrowed; leaves chartaceous, green to brown-green above when dry, lighter below, narrowly elliptic to narrowly obovate, 7–21 cm long, 2.3–7.5 (9) cm wide, apex acute to acuminate, base acute to attenuate, margin crenulate to serrulate; upper leaf surface glabrous or with occasional trichomes on veins, lower leaf surface glabrous with scattered strigillose or setulose trichomes on veins, villous or not in axils of secondary veins; secondary veins 7–15 pairs, tertiary veins not prominent; inflorescence 4–24 (30)-flowered, 5–17 cm long, 5–9 cm wide, peduncle glabrous to plumulose-setulose and stellate-pubescent, 4–7 cm long, 1–2 mm in diameter, bracts linear, lanceolate or triangular, margin entire, glabrous or densely to abundantly plumulose-setulose and with tufted trichomes, 2–20 mm long, 1–4 mm wide; flowers 15–22 mm broad, buds about 4–8 mm in diameter, pedicels sparsely to abundantly stellate-pubescent and with tufted trichomes or densely stellate-pubescent and basally plumulose-setulose, 0.6–2 (–2.5) mm long, 0.4–0.7 mm wide; sepals 5, broadly elliptic to rotund, 5–10 mm long, 4–6 mm wide, sepal surfaces exposed in bud glabrous or rarely with sparse stellate trichomes and basally plumulose-strigillose, surfaces imbricated in bud densely stellate-pubescent, rarely glabrescent, all sepals densely stellate-pubescent or rarely subapically stellate-pubescent within, ciliate; petals 5, white, 6–13 mm long, (3–) 4–5 mm wide; stamens 24–28(–43), filaments 3.2–3.4 mm long, anthers about 2.3–3 mm long; ovary glabrous, styles 5–5.5 mm long; fruit 7–10 mm in diameter, when dry. Flowering Oct–Mar.

Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, and Pine-Oak-Liquidambar Forest; rare in Northern Highlands, common in Sierra Madre; 740–2400 m. Mex. (Chis.), Guat., Salv., Nic. CHIAPAS COLLECTIONS: *HM 519* (DS, NY); *X&S X-421* (DS); *EM 0482* (MICH, MO, US); *EM 0575* (MICH, MO US); *EM 2654* (A, DS, F, K, MICH, NY, US); *EM 2975* (A, F, MICH, MO, NY); *EM 5106* (F); *EM 6191* (DS, F, NY); *EM 18476* (F); *Mi 1688* (DS); *Mi 1735* (US); *Mi 6956* (US); *T 3835* (DS, NY); *T 3868* (DS, F, MICH); *Ve 517* (CAS); *Ve 1088* (CAS); *Ve 1097* (CAS); *Ve 5022* (CAS); *24075*; *24115*; *24417*; *30976*; *31662*; *31928*; *42581*; *42618*; *47672*; *48709*; *58155*.

Saurauia kegeliana is an easily recognized species with tertiary veins immersed and a rather uncharacteristic calycine pubescence pattern. Sepal surfaces exposed in bud are glabrous while those imbricated in bud are pubescent with stellate trichomes. Normally in Central American *Saurauia*, if trichomes are present on dorsal sepal surfaces, they are usually on surfaces exposed in bud and may or may not be on imbricated surfaces. *Breedlove 24075* from Cerro Tres Picos and *Ton 3835* from the Río Cuztepeques differ from typical *S. kegeliana* in having basally plumulose-setose trichomes on sepal surfaces exposed in bud.

5. Saurauia leucocarpa Schltdl., Linnaea 10:249. 1836.

—TYPE: Mexico, Veracruz, Cuesta Grande de Chiconquiaco, *Schiede 330* (GOET; isotypes: HAL, MO!, NY!).

Saurauia barbigera Hook., Icon. Pl. 4:t. 331. 1841.—*Saurauia leucocarpa* var. *wildemanii* Buscal., Malpighia 29:111. 1921.—LECTOTYPE (here chosen): Mexico, Veracruz, Jalapa, *Galeotti 3088* (K!; isolectotypes: G!, K!, P!).

Saurauia pseudopringlei Buscal., Malpighia 28:378. 1919.—TYPE: Mexico, Oaxaca, Cuicatlán, Coyula do Cuyamecalco, *Conzatti & Cancino 2467* (TO? [Herb. Buscalioni]; isotypes: BM!, F!, NY!).

ILLUSTRATIONS: Hooker, Icon Pl. 4:t. 331. 1841; Hutchinson, Fam. fl. pl. Dicot 177. 1926; Malpighia 26:t.8; fig 16. 1927; Flora de Veracruz 35:11, fig 1. 1984.

Trees to 6 m tall; branchlets minutely stellate-pubescent, bark brown, striate and wrinkled; leaves chartaceous, narrowly obovate, dark olive green to brown above when dry, lighter below, 4.5–15.5 cm long, 2–5.8 cm wide, apex acute or apiculate, base acute, margin serrate to serrulate; upper leaf surface glabrous with occasional trichomes on primary vein, lower leaf surface the same, villous in axils of secondary veins; secondary veins 8–13 pairs, tertiary veins not prominent; petioles abundantly minutely stellate-pubescent and sparsely strigillose, 12–18 mm long, about 1 mm wide; inflorescence 29–45-flowered, 6–15 cm long, 3–8 cm wide; peduncle abundantly stellate-pubescent and sparsely strigillose, 3–8 cm long, about 1 mm in diameter; bracts linear or triangular, abundantly stellate-pubescent, 1–1.5 mm long, 0.5–1 mm wide; flowers 7–11 mm broad, buds 2–3 mm in diameter, pedicels minutely stellate-pubescent, 1–4 mm long, about 0.5 mm wide; sepals (4)5, rotund, 1.9–3 mm long 1.6–1.8 mm wide, all sepals abaxially glabrous or with sparse translucent stellate trichomes at base, all glabrous within; petals 5, white, 3–4 mm long, 2–3 mm wide; stamens 22–30, filaments about 1.4–1.8 mm long, anthers 0.8–1.1 mm long; ovary glabrous, styles 5, about 2.2 mm long; fruit 2.5 mm in diameter. Flowering May–Jul.

Streams and mountain slopes in Evergreen Cloud Forest and Pine-Oak-*Liquidambar* Forest; uncommon in Sierra Madre; Mex. (Hgo., Pue., Ver., Gro., Oax.); Hond., Salv. CHIAPAS COLLECTIONS: *P 10025* (US); *P 10087* (US); *Rey 1870* (CAS); *25120*.

Chiapas collections of *S. leucocarpa* differ slightly from the type and other Central American collections in having sparse stellate trichomes at the base of the calyx. In all other respects Chiapas plants are typical of *S. leucocarpa*.

6. Saurauia madrensis B.T. Keller & Breedlove, Syst. Bot. 6:65. 1981.

—TYPE: Mexico, Chiapas, Municipio of Siltepec, above Siltepec on road to Huixtla, *Breedlove 40422* (DS!; isotype: MICH!).

ILLUSTRATION: **Fig. 1**; Syst. Bot. 6:66. 1981.

Trees to 13 m tall; branchlets abundantly to densely long strigose or soft hirsute, bark brown, deeply sulcate, striate or wrinkled; leaves coriaceous or subcoriaceous, dark green, grey-green, or brown above, lighter green or yellowish brown below when dry, dull, 4–11 cm wide, apex acute, apiculate or obtuse, base obtuse, rounded or subcordate, often oblique, margin slightly sinuate to erose, serrate or serrulate; upper leaf surface abundantly hirtellous, lower leaf surface abundantly stellate- and dendritic-pubescent, floccose in axils of secondary veins, sometimes floccose along midrib as well; secondary veins 14–25 pairs, tertiary veins elevated, more prominent than lesser venation; petioles abundantly or densely plumulose-hirsute and stellate-pubescent, 15–55 mm long, 2–3 mm wide; inflorescence 15–60-flowered, 5.5–18 (22) cm long, 3.5–8 cm wide; peduncle abundantly to densely plumulose-hirsute, 3.5–11 cm long, 2–3 mm in diameter; bracts narrowly lanceolate or triangular, densely hirsute, 1–13 mm long, 1–4 mm wide, inner two and imbricate sepals rotund, 4–5 mm wide, sepal surfaces exposed in bud abundantly plumulose-hirtellous or basally plumulose-hirtellous and stellate-pubescent, surfaces imbricated in bud glabrous, ciliate, all sepals glabrous within; petals 5, white, 8–13 mm long, 5–9 mm wide; stamens 23– 37, filaments 3.4–4 mm long, anthers 2.2–3 mm long; ovary glabrous, styles not developed; fruit 12–15 mm in diameter when dry. Flowering Sep–Jan.

Chiapas endemic: Montane Rain Forest and Evergreen Cloud Forest; common in Sierra Madre;1400–3000 m. CHIAPAS COLLECTIONS: *EM 0441* (MICH, US); *EM 1010* (A, MICH, MO); *EM 4089* (A, DS, F, NY); *EM 17809* (F); *Mi 7924* (US); *P 7014* (UC, US); *P 7723* (UC); *22745*; *31117*; *31788*; *40214*; *41717*; *42743*; *42799*; *46160*; *46216*; *48666*; *55711*; *55934*; *65705*.

Saurauia madrensis appears to be related to *S. zahlbruckneri* on the basis shared floral and sepal characteristics. Leaves of *S. madrensis* are abun-

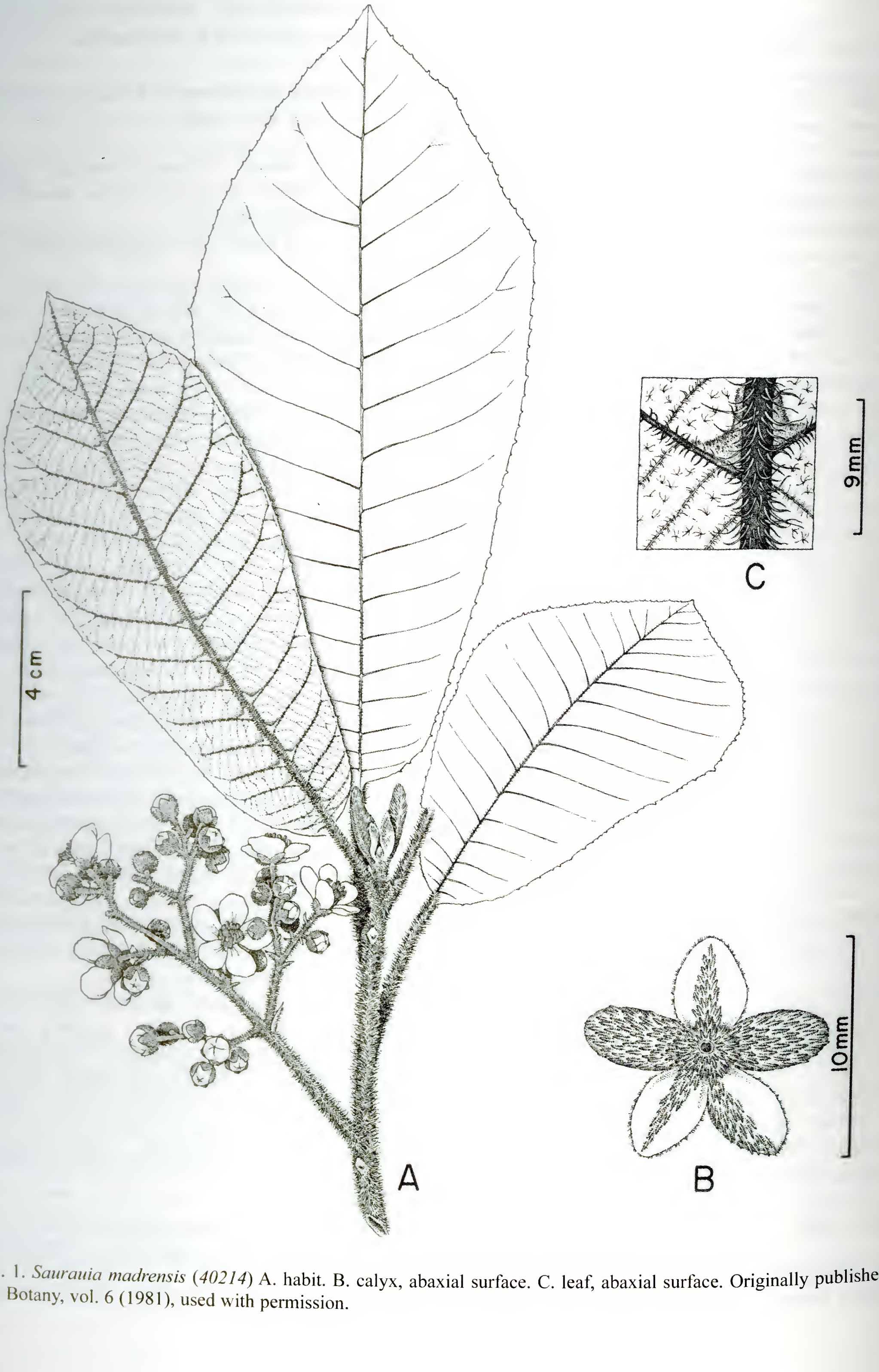

FIGURE. 1. *Saurauia madrensis* (*40214*) A. habit. B. calyx, abaxial surface. C. leaf, abaxial surface. Originally published in Systematic Botany, vol. 6 (1981), used with permission.

dantly stellate-pubescent below, and its peduncles and petioles are densely long-hirsute with trichomes to 4 mm long. Leaves of *S. zahlbruckneri* are glabrous below and peduncles and petioles of that species are sparely hirtellous. *Saurauia madrensis* appears to be endemic to the Sierra Madre of Chiapas. *Saurauia zahlbruckneri* occurs on limestone ridges in southeastern Chiapas and extends southeastward through Guatemala to Honduras.

7. Saurauia matudae Lundell, Contr. Univ. Michigan Herb. 7:27. 1942.

—TYPE: Mexico, Chiapas, Letrero, near Siltepec, *Matuda 4339* (MICH!, isotypes: A!, GH!, MICH!, MO! NY!).

ILLUSTRATION: none found.

Shrubs and trees to 7 m tall; branchlets abundantly paleaceous-setose, bark brown to reddish-brown, striate and wrinkled; leaves chartaceous to subcoriaceus, dull green to brownish-green above, green to rusty-brown below, narrowly obovate to obovate, 10–22 cm long, 4.5–9.5 cm wide, apex acuminate, base obtuse, rounded or truncate, sometimes oblique, margins setaceo-serrate; upper leaf surface setose on primary and secondary veins, setae 3–6 mm long, glabrous between veins, lower leaf surface abundantly setose on primary and secondary veins, setae 3–6 mm long, glabrous between veins, glabrous in axils of secondary veins; secondary veins 14–21 pairs, tertiary veins raised, more prominent than lesser venation; petioles 15–45 mm long, 2–3 mm wide, abundantly paleaceous-setose, setae 4–7 mm long or more, 1 mm wide at base; inflorescence 30–90–flowered, 15–19 cm long, 8–11 cm wide; peduncle paleaceous-setose, 5–9 cm long, 1–2 mm in diameter; bracts narrowly elliptic to narrowly obovate, abundantly paleaceous-setose, 8–23 mm long, 1–5 mm wide; flowers 15–22 mm broad, buds 4–8 mm in diameter, pedicels setose, 5–15 mm long, 0.5–1 mm wide; sepals 5, 5–7 mm long, the outer ovate, 3.5–4 mm wide, the inner and imbricate sepals rotund 4–5 mm wide, sepal surfaces exposed in bud setose, setae 2–3 mm long, surfaces imbricated in bud glabrous, all sepals glabrous within; petals 5, white, 7–11 mm long, 5–6 mm wide; stamens 15–21, filaments about 2.2 mm long, anthers about 2.5 mm long; ovary glabrous, styles 5, obsolete or 5–6 mm long; fruit about 11 mm in diameter, glabrous. Flowering Jan, Jul, Dec.

Montane Rain Forest, Evergreen Cloud Forest, and Evergreen Cloud Scrub; uncommon in Sierra Madre; 1700–2500 m. Mex. (Oax., Chis.) CHIAPAS COLLECTIONS: *EM 4339* (A, MICH, MO, NY); *He 1167* (CAS); *30122*; *58323*.

Saurauia matudae is most closely related to *S. cuchumatanensis* but differs from that species by its long-setose and paleaceous trichomes on the primary and secondary veins, and mostly glabrous leaf surfaces between the veins. Trichomes of *S. cuchumatanensis* are hirsute or plumulose-hirsute, and abaxial leaf surfaces in that species are sericeous or abundantly pubescent with long rusty trichomes.

8. Saurauia oreophila Hemsl., Diagn. Pl. Nov. 1:3. 1878.

—TYPE: Guatemala, Volcán de Fuego, *Salvin s.n.* (K!).

Saurauia latipetala Hemsl., Diagn. Pl. Nov. 1:4. 1878.—TYPE: Mexico, Chiapas, without specific locality, *Ghiesbreght 646* (K!; isotypes: BM!, G!, GH!, MO!, NY!).

Saurauia pauciflora Rose, Contr. U.S. Natl. Herb. 8:52. 1903.—TYPE: Mexico, Chiapas, San Cristóbal, *Nelson 3206* (US!; isotype: GH!).

Saurauia subalpina Donn. Sm., Bot. Gaz. (Crawfordsville) 42:292. 1906.—TYPE: Guatemala, Sacatepéquez, Volcán de Agua, *Donnell Smith 2171* (US!; isotype: GH!).

Saurauia pauciflora var. *ghiesbreghtii* Buscal., Malpighia 26:291. 1913.—TYPE: Mexico, Chiapas, without specific locality, *Ghiesbreght 606* (Herb. Imperiale di Pietroburgo).

ILLUSTRATION: Malpighia 25:t. III, fig. 2. 1913.

Trees and shrubs 2–8 m tall; branchlets densely to abundantly long strigose or setose, trichomes to 3.5 mm long, bark gray to light brown, furrowed to deeply sulcate; leaves chartaceous, dark brown to olive-green when dry, lighter below, narrowly elliptic or narrowly obovate to lanceolate, 4.5–20 cm long, 1.5–6.5 cm wide, apex acute to attenuate, base acute to obtuse, margin setaceo-serrate to setaceo-serrulate; upper leaf surface abundantly setose to setulose, trichomes on midvein to 2.5 mm long, lower leaf surface abundantly stellate-pubescent between veins; secondary veins 9–23 pairs, tertiary veins elevated, more prominent than lesser venation; petioles densely long-strigose or setose to abundantly long-setose and with tufted trichomes, 6–25 mm long, 1.2–2. mm wide; inflorescence usually shorter than leaves, 4–35-flowered, 3.5–15 cm long, 3–8 cm wide; bracts hirsutellous, linear, 3–15 mm long; flowers (11–) 13–22 mm broad, buds 2–6 mm in diameter, pedicels abundantly to densely hirtellous or hirtellous and with tufted trichomes, 0.3–1 mm long, 0.6–0.7 mm wide; sepals 5, 5–6 (–8) mm long, the outer two broadly ovate, 3–4 mm wide, the inner and imbricate sepals rotund, 4–5(6) mm wide, sepal surfaces exposed in bud sparsely to abundantly hirsutellous or plumulose-hirsutellous and stellate-pubescent, surfaces imbricated in bud glabrous, all sepals glabrous within, ciliate; petals 5, white or pink, 7–11 mm long, 4–8 mm wide; stamens 21–25, filaments about 2.6 mm long, anthers about 2.2 mm long; ovary glabrous, styles 5, 5 mm long or obsolete; fruit about 1 cm in diameter when dry. Flowering throughout the year.

Steep slopes in Evergreen Cloud Forest; common in Central Plateau; 200–2800 m; Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *La 1511* (DS, US); *Lo 325* (CAS); *PL 325* (CAS); *SR 671* (CAS); *SR 948* (CAS); *T 94* (DS); *T 438* (DS, F, MICH); *T 471* (DS, US); *T 687* (DS); *T 1309* (DS, NY, US); *10823*; *10913*; *12444*; *12952*; *14698*; *15221*; *22942*; *27213*; *27699*; *40814*; *41095*; *41266*; *46754*; *47851*; *49382*; *50028*; *51322*; *51542*; *51802*; *51803*; *51804*; *53227*; *65997*; *68590*; *68744*; *69854*.

Breedlove 14698 from Rancho Nuevo, *Breedlove 51322* from the vicinity of Las Margaritas, and two collections from the Sierra de los Cuchumatanes in Guatemala (*Breedlove 11641* and *Steyermark 49865*) differ from the typical condition of predominantly stellate trichomes on the lower leaf surface and calyx, by having abundant hirtellous and villous trichomes on the leaves and calyces.

9. **Saurauia pustulata** G.E. Hunter, Ann. Missouri Bot. Gard. 53:63. 1966.

—TYPE: Mexico, Chiapas, Fenia, *Purpus 10333* (US; isotypes: NY!, UC!).

ILLUSTRATION: Ann. Missouri Bot. Gard. 53:62. 1966.

Trees and shrubs 3–9 m tall; branchlets with strigillose or strigillose and radiate trichomes to glabrous on older wood, bark dark reddish-brown, shallowly furrowed; leaves chartaceous, green to dark brown-green above when dry, lighter below, narrowly elliptic to narrowly obovate, (4.5) 7–18 cm long, 1.5–7 cm wide, apex acute to apiculate, base attenuate, margin setaceo-serrate to setaceo-serrulate; upper leaf surface glabrous or sparsely setulose, lower leaf surface mostly glabrous, sparsely setulose on veins, not villous in axils of secondary veins, densely pustulate on both surfaces; secondary veins 10–17 pairs, tertiary veins immersed, not raised though occasionally more prominent than lesser venation; petioles sparsely to abundantly strigillose, 8–35 mm long, 0.8–2 mm wide; inflorescence 10–40-flowered, 7–19 cm long, 4–6 mm wide; peduncle abundantly to sparsely strigillose and with radiate trichomes, 4–14 cm long, 1–2 mm in diameter; bracts lanceolate, entire, abundantly strigillose and with radiate trichomes, 1.4–6 mm long, 0.5–2 mm wide; flowers about 12 mm broad, buds 3–4 mm in diameter, pedicels abundantly strigillose and with radiate trichomes, 1–7 mm long, 0.4–0.8 mm wide; sepals 5, 4.5–7 mm long, the outer two broadly elliptic, 4–5.5 mm wide, the inner and imbricate sepals rotund, 5–6 mm wide, sepal surfaces densely stellate-pubescent, all sepals densely stellate-pubescent along margins within, ciliate; petals 5, white 4.5–6 mm long, 2–3 mm wide; stamens about 30, filaments 1.6 mm long, anthers 1.7–1.9 mm long; ovary glabrous, styles 5, about 2 mm long; fruit 7 mm in diameter when dry. Flowering Jan, Sep.

Chiapas endemic: steep slopes and along streams in Montane Rain Forest; uncommon in Northern Highlands; ca. 1700 m. CHIAPAS COLLECTIONS: *32399*; *32588*; *41661*; *49320*.

10. **Saurauia rubiformis** Vatke, Linnaea 40:221. 1876.

—SYNTYPES: Costa Rica, Candelaria, Hoffman 814 (B), Warscewicz 160 (B).

Saurauia sarapiquensis Carr., Rev. Hort. 49:60, 1877.—TYPE: not designated.

Saurauia polyantha Gilg in Engler & Prantl., Naturl. Pflanzenfam. III, 6:128, fig. 67. 1893, ex icon.

Saurauia rubiformis f. *aspera* Buscal., Malpighia 27:145. 1916.—TYPE: Costa Rica, San José, La Palma, *Tonduz 12422* (*Donn. Sm. Pl. Guat. 7373*) (US!; isotypes: F!, GH!, K!, NY!, US!).

Saurauia pseudorubiformis Buscal., Malpighia 27:149. 1916.—LECTOTYPE (here chosen): Costa Rica, Cartago, Volcán Turrialba, *Pittier 13202* (*Donn. Sm. Pl. Guat. 7524*) (US!; isolectotypes: G!, GH!, US!).

Saurauia pseudorubiformis Buscal. var. *guatemalensis* Buscal., Malpighia 27:155. 1916.—LECTOTYPE (here chosen): Guatemala, Alta Verapaz, Cobán, *von Tuerckheim 8498* (US!; isolectotypes: F!, GH!, K!, NY!, US!).

ILLUSTRATIONS: Gilg & Wedermann in Naturl. Pflanzenfam., ed. 2, xxi: 43. 1925; Malpighia 26:t. 10, fig. 20. 1927.

Trees 4.5–6 m tall; branchlets pubescent, bark light brown, striate, abundantly strigose; leaves chartaceous, green to dark brown when dry, narrowly obovate to obovate, 5.5–21.5 cm long, 2–8.2 cm wide, apex acute, apiculate, base acute, margin serrulate; upper leaf surface short-setose, lower leaf surface sparsely stellate-pubescent, not villous in axils of secondary veins; secondary veins 11–22 pairs, tertiary veins raised, more prominent that lesser venation; petioles densely setulose and stellate-pubescent, 7–22 mm long, about 1 mm wide; inflorescence shorter than leaves, 7–15 flowered, 3–5 cm long, 2–3 cm wide; flowers 2–2.5 cm broad, buds 5–8 mm in diameter, pedicels densely setulose and stellate-pubescent, 2.5–4 mm long, about 1 mm wide; sepals 5, rotund, 4–8 mm long, 4–6 mm wide, sepal surfaces exposed in bud abundantly setose and densely stellate-pubescent, surfaces imbricated in bud densely stellate-pubescent, all sepals densely stellate-pubescent within; petals 5, white, 6–12 mm long, 4–5 mm wide; stamens 26–31, filaments about 4 mm long, anthers about 3 mm long; ovary glabrous, styles 5, to 4 mm long or obsolete; fruit about 1.2 cm in diameter when dry. Flowering Aug–Sep.

On slopes and along streams in Pine-Oak-*Liquidambar* Forest; uncommon in Northern Highlands; 1350–1800 m., Mex. (Chis.), Guat., Hond., C.R., Pan. CHIAPAS COLLECTIONS: *11946*; *32492*; *49373*; *52654*.

11. Saurauia scabrida Hemsl. Diagn. Pl. Nov. 1:3. 1878.

—TYPE: Mexico, Veracruz, Valle de Cordova, *Bourgeau 1747* (K!, isotypes: F! fragment, G !, P !).

Saurauia nelsonii Rose, Contr. U.S. Natl. Herb 8:52. 1903.—TYPE: Mexico, Oaxaca, Totontepec, *Nelson 800* (US!; isotype: US!).

Saurauia selerorum Buscal. var. *pseudonelsonii* Buscal., Malpighia 26:107. 1913.—TYPE: Mexico, Cratere di San Martin, *Galeotti s.n.* (BR).

Saurauia villosa DC. var. *macrantha* Buscal., Malpighia 26:310. 1913.—LECTOTYPE (here chosen): Mexico, Chiapas, between Tenejapa and Yajalon, *Nelson 3249* (US!).

Saurauia villosa DC. var. *tubercolata* Buscal., Malpighia 26:312. 1913.—LECTOTYPE (here chosen): Guatemala, Santa Rosa, Río de los Esclaves, *Heyde & Lux 6077* (US!; isolectotypes: F!, G!, GH!, K!, MO!).

Saurauia scabrida Hemsl. var. *hemsleyana* Buscal., Malpighia 26:409. 1913.—LECTOTYPE (here chosen): Mexico, Veracruz, region of Orizaba, *Botteri 858* (P!).

ILLUSTRATIONS: Malpighia 28: t. 2, fig. 27. 1927.

Trees and shrubs 2–12 m tall; branchlets abundantly strigose or setose, densely stellate-pubescent and with tufted trichomes, bark light brown to brown, striate and sulcate; leaves subcoriaceous to coriaceous, surface scabrous with bases of broken trichomes, yellow-green to green or brown, lighter below, elliptic to broadly elliptic or narrowly obovate, 8–32 cm long, 3–13.5 cm wide, apex acute, base acute, rounded or sometimes oblique, margin setaceo-serrate or setaceo-serrulate and erose; upper leaf surface abundantly strigose, trichomes often with pale pustulate bases, young leaves hirsute, lower leaf surface abundantly to densely stellate- and dendroid-pubescent, strigillose on major veins, floccose in axils of secondary veins; secondary veins 19–30 pairs, tertiary veins raised, more prominent than lesser venation; petioles abundantly to densely plumulose and strigose or setose and densely stellate-pubescent, 1–5 cm long, 3–4 mm wide; inflorescence about 50–100 flowered, 6.5–32.5 cm long, 5.5–15 cm wide; bracts linear-lanceolate, densely hirsute and stellate-pubescent, 4–13 mm long, 1.5–3 mm wide; flowers 11–23 mm broad, buds 2–7 mm in diameter, pedicels abundantly hirsutellous and densely stellate-pubescent, 3–15 mm long, 1–1.5 mm wide; sepals 5, rotund, 4–9 mm long, 2.5–7 mm wide, sepal surfaces exposed in bud densely plumulose-strigillose and stellate-pubescent, surfaces imbricated in bud densely stellate-pubescent to margin or submarginally glabrous, all apically or marginally stellate-pubescent within; petals 5, white, 7–13 mm long, 5–6 mm wide; stamens 28–39, filaments about 2.8 mm long, anthers about 1.6–1.8 mm long; ovary glabrous, styles 5, about 4 mm long; fruit 6–10 mm in diameter when dry. Flowering throughout the year.

Slopes in Montane Rain Forest, Evergreen Cloud Forest, and Pine-Oak-*Liquidambar* forest; common in Northern Highlands, Eastern Highlands and Central Plateau, uncommon in Sierra Madre; (550) 1170–1850 m. Mex. (Ver., Oax., Chis.), Guat., Hond., Salv. CHIAPAS COLLECTIONS: *Br 43* (CAS); *C 362* (DS); *C 392* (DS, NY); *C&L 83* (CAS); *Cro 40396* (MO); *Cro 40404* (MO); *Da 9447* (MO); *EL 5862* (US); *EL 7213* (DS); *EM S-172* (MO); *GG 38* (CAS); *GG 397* (CAS); *Han 1658* (MICH); *La 1090* (DS, US); *La 1243* (DS, MICH); *L&S 9979* (CAS, MICH); *LL 6371* (CAS); *Max 222* (MO); *R&B 20052* (DS, F); *RM 554* (CAS); *R&R&M 1169* (DS, F); *R&R&M 1218* (F); *SC 90* (CAS); *SC 163* (CAS); *SC 787* (CAS); *T 583* (DS, NY, US); *T 1698* (DS, MICH, US); *T 2481* (DS, NY); *T 2535* (DS); *T 2819* (DS, F, MICH); *T 3481* (DS); *T&L 40071* (DS); *T&L 41509* (DS); *Ti 636-47* (DS); *We 17746* (DS); *6152*; *6499*; *7550*; *7770*; *8863*; *9379*;

10484; *10563*; *10933*; *10949*; *11032*; *11189*; *11312*; *11665*; *11977*; *12550*; *12616*; *12698*; *14578*; *14718*; *14828*; *14977*; *22869*; *24007*; *24857*; *27771*; *31297*; *40513*; *40953*; *46951*; *48138*; *49267*; *49289*; *49386*; *49387*; *49471*; *49472* ; *49479*; *51746*; *51475*; *52021*; *53172*; *53501*; *55407*; *56983*; *60255*; *67997*; *68605*.

12. Saurauia selerorum Buscal., Malpighia 26:100. 1913.

— TYPE: Guatemala, Huehuetenango, San Martin, *Seler & Seler 2819* (B; isotypes: CAS!, GH!, US!).
ILLUSTRATIONS: Ann. Missouri Bot. Gard. 53:76. 1966.

Trees and shrubs to 12 m; branchlets hirsute, setose and villous, bark brown, sulcate; leaves chartaceous to subcoriaceous, green to dark olive green above, lighter below, narrowly to broadly elliptic, 10–33 cm long, 5–15 (17) cm wide, apex acute or attenuate, base obtuse to attenuate, margin setaceo-serrulate to setaceo-serrate; upper leaf surface abundantly to densely setulose or hirsute, lower leaf surface sparsely stellate-pubescent to densely stellate- and dendroid-pubescent, with loriform trichomes on major veins, floccose in axils of secondary veins; secondary veins 16–28 pairs, tertiary veins raised, more prominent than lesser venation; petioles hirsute and stellate-pubescent to densely villous, 15–45(–55) mm long, to 3 mm wide; inflorescence (12–)20–100-flowered, 2.8–20(–24) cm long, 6–10(–15) cm wide; peduncle abundantly to densely hirsute and with loriform and stellate trichomes, 1–11(–15) cm long, 2–3(–4) mm in diameter; bracts linear lanceolate, densely hirsute, 7–12 mm long, 1.5–4 mm wide; flowers 12–20 mm broad, buds 3–6 mm in diameter, pedicels densely hirsute, 4–8.5 mm long, 0.6 mm wide; sepals 5, 5–7 mm long, the outer two elliptic, apex acute to obtuse, 3–4 mm wide, the inner and imbricate sepals rotund, 4–5 mm wide, sepal surfaces exposed in bud abundantly to densely plumulose-strigillose, hirsute or plumulose-hirsute and sparsely stellate-pubescent, surfaces imbricated in bud glabrous, all sepals glabrous within, ciliate; petals 5, white, 8–11 mm long, 4–7 mm wide; stamens 23–35, filaments 2 mm long, anthers 2.2–2.4 mm long; ovary glabrous, styles 5, 4–6 mm long; fruit 6–12 mm in diameter when dry. Flowering Mar, Jun, Sep–Dec.

Steep slopes in Montane Rain Forest and Evergreen Cloud Forest; common in Sierra Madre; 1600–2400 m. Mex. (Chis.), Guat., Hond., Salv. CHIAPAS COLLECTIONS: *EM 1003* (A, F, MICH, MO); *EM 1694* (A, F, K, MICH, MO, NY); *EM 2301* (A, MICH, NY); *EM 2947* (F, MICH); *EM 15515* (F); *EM 18074* (DS, F); *EM 18075* (DS, F); *X&S X-467* (DS); *Mi 7039* (US); *P 7013* (A, F, GH, MO, NY, UC); *RM 488* (CAS); *24418*; *31053*; *31402*; *31715*; *40423*; *40245*; *41719*; *55801*.

Saurauia selerorum is similar to *S. aspera.* It is distinguished from that species by its stellate trichomes on the abaxial surfaces of the leaves and its longer plumulose-strigillose or hirsute pubescence on the calyx.

13. Saurauia villosa DC., Mém. Soc. Phys. Genève 1:420, t. 2. 1822.

—*Leucothea villosa* Moc. & Sessé ex DC., Mém. Soc. Phys. Genève 1:420. 1822, nom. nud.—*Davya villosa* Moc. & Sessé ex DC., Prod. 1:525. 1824, nom. nud.—TYPE: plate ("Tab. II"), which was based on a Mociño and Sessé drawing from Mexico.
Obelanthera melastomacea Turcz., Bull. Soc. Imp. Naturalistes Moscou 20(1):148. 1847.—*Saurauia obelanthera* Turcz., Bull. Soc. Imp. Naturalistes Moscou 31(1):245. 1858.—SYNTYPES: Mexico, Oaxaca, Sierra San Pedro Nolasco, Talea, etc., 1843–44, *Jurgensen 896* (BM!, G!, K!).
Saurauia pseudopeduncularis Buscal., Malpighia 26:30. 1913.—SYNTYPES: Mexico, Oaxaca, "Sierra S. Pedro di Nolasco, Talea et.," *Jurgensen 896* (BM!, G!, K!, LZ).
Saurauia villosa DC. var. *hahnii* Buscal., Malpighia 26:305. 1913.—SYNTYPES: Mexico, Oaxaca, Misantla, 1866, *Hahn s.n.* (LE; isosyntypes: K!, P!); Veracruz, Orizaba, *Botteri 1126* (K, US!; isosyntypes: BM!, F!, GH!, MO!), *Botteri 494* (K!, P!; isosyntypes: BM!); Veracruz, "Rio Branco d'Orizaba (*Collez. di Borgeau 1865–66*)" (P); Veracruz, Orizaba, *Galeotti 7057* (P!); Veracruz, "Monti de S. Cristofaro de Orizaba (Maggio 1866)" (P); Veracruz, Zacuapan, *Purpus s.n.* (US); Veracruz, Huatusco, *Sriesbacht* [*Ghiesbreght*?] *71* (P); "Nuova Espana (Cl.12)," without collector (BM).
Saurauia speluncicola Schultes, Bot. Mus. Leafl. 8:193. 1940.—TYPE: Mexico, Oaxaca, District of Teotitlán, San Antonio Eloxochitlán, *Schultes 795* (GH!).
ILLUSTRATION: Mém. Soc. Phys. Genève 1:420, t. 2. 1822.

Trees to about 15 m tall; branchlets abundantly setose, bark dark brown, striate; leaves chartaceous to subcoriaceous, green above, white tomentose below when dry, elliptic to narrowly elliptic, 12.5–35 cm long, 3.7–11 cm wide, apex acute or acuminate, base acute, sometimes oblique, margins setaceo-serrate; upper leaf surface abundantly setose, base of trichomes sometimes pale when dry, lower leaf surface densely white stellate-pubescent, trichomes obscuring surface, abundantly rusty-hirtellous on veins, not villous or floccose in axils of secondary veins; secondary veins 14–27 pairs, tertiary veins elevated, more prominent than lesser venation; petioles densely setose and abundantly stellate-pubescent, 2–4 cm long, 2–5 mm wide; inflorescence (10–) 12–18(–30)-flowered, 8–23 cm long, 3–9 cm wide; peduncle abundantly to densely setose and stellate-pubescent, 6.5–19 cm long, 1.5–3 mm in diameter; bracts lanceolate or narrowly obovate, densely setose, to 12 mm long, 4–5 mm wide; flowers 15–24 mm broad, buds 5–9 mm in diameter, pedicels densely setose, 1–3 mm long; sepals 5, 6–10 mm long, 5–6 mm wide, the outer two broadly ovate, apex acute, the inner two and imbricate sepals rotund, apex rounded, sepal surfaces exposed in bud densely setose, trichomes to 6 mm long, surfaces imbricated in bud densely stellate-pubescent, all sepals densely stellate-pubescent within; petals 5, white, 12 mm long, 6–8 mm wide; stamens (20–) 27–31, filaments to 3 mm long, anthers 1.2–2.6 mm long; ovary glabrous, styles 3 mm long or obsolete; fruit about 7 mm in diameter. Flowering Dec–Feb.

Lower Montane Rain Forest; rare in Eastern Highlands; 550 m. Mex. (Ver., Oax., Chis.). CHIAPAS COLLECTIONS: *T 5522* (CAS); *48319*; *49506*; *49512*; *49513*; *49514*; *49486*; *49487*; *49488*; *49489*.

Saurauia villosa was previously known only from Oaxaca and Veracruz.

14. Saurauia yasicae Loes., Bot. Jahrb. Syst. 23:125. 1896.

—TYPE: Nicaragua, Matagalpa, Cañada Yasica, *Rothschuh 246* (B; isotypes: IT, US!).

Saurauia herbert-smithii Rusby, Descr. 300 New Sp. S. Amer. Pl., 57. 1920.—TYPE: Colombia, Calagualita, *Smith 857* (NY; isotypes: G!, K!, MICH!).

Saurauia smithiana Buscal., Malpighia 29:445. 1923.—SYNTYPES: Colombia, Calagualita, *Smith 857* (G!, K!, MICH!, NY); Colombia, *Smith 1774* (NY).

Saurauia leucocarpa Schltdl. var. *smithiana* Buscal., Malpighia 29:232. 1922.—LECTOTYPE (here chosen): Guatemala, Alta Verapaz, Pansamala, *von Tuerckheim 1445* (P!; isolectotypes: G!, GH!, K!, NY!, US!).

Saurauia yasicae var. *laevigata* Buscal., Malpighia 29:366. 1922.—LECTOTYPE (here chosen): Costa Rica, Tuis, *Tonduz 11453*, (*Donn. Sm. Pl. Guat. 7320*) (US!; isolectotypes: BM!, G!, GH!, US!).

Saurauia pseudopittieri Buscal., Malpighia 30:97. 1927.—TYPE: Costa Rica, Prov. Cartago, Tuis, *Pittier 11247*, (*Donn. Sm. Pl. Guat. 7318*) (K!; isotypes: G!, US!).

Saurauia zetekiana Standl., J. Arnold Arbor. 11:124. 1930.—TYPE: Panama, Barro Colorado Island, *Bangham 578* (F!; isotypes: A!, G!).

Saurauia belizensis Lundell, Field & Lab. 13:7. 1945.—TYPE: Belize, between Monkey River and Cockscomb, *Gentle 4439* (SMU!; isotypes: MICH!, SMU!).

ILLUSTRATION: Ann. Missouri Bot. Gard. 53:85, fig. 5. 1966.

Trees and shrubs to 27 m tall; branchlets glabrous to sparsely strigose near apex, bark dark brown to blackish, tuberculate, shallowly furrowed, leaf scars and lenticels prominent; leaves chartaceous, blackish-green, brown or olive when dry, lighter below, obovate to broadly elliptic, 6–22 (27) cm long, 2.5–10 cm wide, apex rounded, apiculate, acute, or acuminate, base acute, margins crenate, crenate-serrulate, or serrate; upper leaf surface glabrous on intercostal regions, pustulate, veins sometimes scabrous, lower leaf surface glabrous on intercostal regions, scattered strigillose on midvein, glabrous in axils of secondary veins; secondary veins 7–18 pairs, tertiary veins immersed; petioles glabrous to sparsely strigillose, 0.8–5 cm long, about 1–2 mm wide; inflorescence (15–) 30–150 or more-flowered, 5–22 cm long, 3–12 cm wide; peduncle with sparse to abundant stellate and radiate trichomes, (3–)4–13 cm long, 1.5–6 mm in diameter; bracts triangular, with abundant stellate and radiate trichomes, 1–3 mm long; flowers 5–10 mm broad, buds 1–3.5 mm in diameter, pedicels abundantly stellate-pubescent, 1–9 mm long, 0.2–1 mm wide; sepals 4 or rarely 5, oblong ovate to rotund, 2–4 mm long, 2–4 mm wide, sepal surfaces exposed in bud glabrous, surfaces imbricated in bud stellate-pubescent, all sepals apically pubescent within; petals 4 or rarely 5, white, obovate, 3.5–5.5 mm long, 2–4 mm wide; stamens 20–35, filaments 1.5–2.2 mm long, anthers 1.2–1.5 mm long; ovary glabrous, 4-loculate, styles 4, 2.8–3.8 mm long; fruit 6–9 mm in diameter when dry. Flowering Jan, Jun–Sep.

Tropical Rain Forest, Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, and Pine-Oak-*Liquidambar* Forest; common in Northern Highlands, Eastern Highlands, Central Depression, and Sierra Madre; 150–1900 m. Mex. (Oax., Tab.) Widely distributed in Central America, extending south to Bolivia. CHIAPAS

COLLECTIONS: *C 47* (DS); *C 81* (DS); *C 209* (DS, F, MICH, NY); *Con 2989* (CAS, MO); *Cro 40313*_(MO); *DD 316* (DS); *DD 373* (DS); *EL 6689* (DS); *EM 2526* (A, DS, F, MICH, NY); *EM 3700* (A, F, K, MICH, MO, NY); *EM 4171* (A, F, MICH, MO, NY); *EM 16417* (DS, F, MICH, NY); *EM 16482* (F); *EM 16536* (F, MICH); *EM 16605* (F, MICH); *EM 16827* (DS, F, MICH); *EM 17884* (DS, F); *EM 18131* (DS, F); *EM 18141* (F); *G&H 423* (MICH); *LL 6424* (CAS); *Mi 5794* (US); *Spe 169* (CAS, MO); *T&L 40539* (DS, F); *Ve 1711* (UC); *Ve 3913* (CAS); *We 17742* (DS); *20293*; *22170*; *26324*; *26451*; *40160*; *45928*; *45945*; *47185*; *47314*; *49570*; *51745*; *69730*.

With its mostly tetramerous flowers, glabrous leaves, and immersed tertiary veins, *S. yasicae* is the most easily recognized species in Chiapas. It is common in Chiapas and in most of Central America. Hunter (1966) treats *S. yasicae* as synonymous with *S. laevigata*, a South American species. In his revision of the South American species of *Saurauia*, Soejarto (1980) points out a significant number of character differences warranting separation of the two species. After examining the types, I agree that the two species are indeed distinct and material from Chiapas should be assigned to *S. yasicae*.

15. Saurauia zahlbruckneri Buscal., Malpighia 29:433. 1923.

—TYPE: Guatemala, Alta Verapaz, Coban, *von Tuerckheim 1286* (W; isotypes: F!, G!, GH!, P!, NY!, GH!).

ILLUSTRATION: Malpighia 26:t. 9, fig. 18. 1913.

Trees and shrubs (2) 3–12 m tall; branchlets strigose to abundantly strigose, bark brown, wrinkled, furrowed with large protruding leaf scars; leaves coriaceous, gray-green to brown when dry, somewhat waxy above, lighter below and dull, elliptic to obovate, (4–) 6.5–25.5 cm long, (1.8–) 3.5–10 cm wide, apex acute or obtuse, base obtuse to rounded, sometimes oblique, margin setaceo-serrulate to serrate; upper leaf surface glabrous on intercostal regions and occasionally hirsute on major veins, lower leaf surface glabrous on intercostal regions and occasionally hirsute on major veins, floccose in axils of secondary veins; secondary veins 14–19 pairs, tertiary veins raised, more prominent than lesser venation; petioles strigillose or abundantly hirsute, 1–5 cm long, 1.5–3 mm wide; inflorescence 17–60-flowered, 7.5–25 cm long, 3–12 cm wide; peduncle sparsely strigillose or hirsutellous, (2–) 4.5–8 (10) cm long, 1–3 mm diameter; bracts lanceolate or triangular, hirsutellous, 1–10 mm long, 1–2 mm wide; flowers 1.3–1.5 cm broad, buds 3–6 mm in diameter, pedicels hirsutellous or hirsutellous and short villous, 1–8 mm long, 1–1.5 mm wide; sepals 5, rotund, 4–6 mm long, 2.5–5 mm wide, sepal surfaces exposed in bud abundantly hirsutellous or hirsutellous and stellate-pubescent or sometimes glabrous in fruiting material, trichomes frequently short plumulose at base, surfaces imbricated in bud glabrous, margin ciliate, all sepals glabrous within; petals 5, white, 7–8 mm long, 4.5–5 mm wide, 29–33, filaments 2.4–2.4 mm long, anthers 2–2.2 mm long; ovary glabrous, styles 5, 5 mm long; fruit about 8 mm in diameter when dry. Flowering Jul–Nov.

Montane Rain Forest and Pine-Oak-*Liquidambar* Forest; uncommon in Central Plateau; 750–1500 m. Mex.(Chis), Guat. CHIAPAS COLLECTIONS : *T 2631* (DS); *35250*; *37090*; *38820*; *41921*; *52236*; *53469*; *71272*.

GARRYACEAE

Thomas F. Daniel

Department of Botany
California Academy of Sciences
875 Howard Street
San Francisco, California 94103

Dioecious, evergreen shrubs or small trees. Leaves simple, opposite, petiolate, exstipulate but leaf bases ± continuous or united by an interpetiolar ridge; blades ± coriaceous, flat to concave-convex, margin entire, flat, revolute, or undulate, abaxial surface glabrous or pubescent. Inflorescence catkin-like, unbranched or branched at base, often pendulous; flowers small, unisexual, borne in axils of opposite, 4-ranked, usually basally fused bracts. Male flowers (1–) 3(–4) per bract, sessile to pedicellate, perianth segments (sepals) 4, actinomorphic, generally connate (or connivent) at tips forming a chamber with 4 slit-like openings; petals absent; stamens 4, alternate with sepals, free, filaments short, anthers 2-thecous, basifixed, introrse, dehiscent by longitudinal slits; pollen 3-colporate. Female flowers 1–3 per bract, sessile or pedicellate, perianth segments absent or vestigial, ovary inferior, 1-celled, styles 2 (–3). Fruit a globose to ovoid to subellipsoid, fleshy berry turning dark blue, black, or whitish gray and becoming brittle at maturity. Seeds generally (1–) 2 (–3), hemispheric to ovoid-ellipsoid. ($x = 11$).

The family consists of a single genus with 15 species distributed from the northwestern United States (Washington) through Mexico to southern Central America (Panama) and the Caribbean (Greater Antilles). The family has often been allied with (or included within) Cornaceae. Molecular sequence data from both chloroplast and nuclear ribosomal DNA suggest a relationship with Aucubaceae and Eucommiaceae; these three unigeneric families can be included in a monophyletic Garryales (Soltis et al. 2000). In some regions (e.g., California, Veracruz), taxa intergrade and can be difficult to distinguish from one another. The family has minor economic importance as some species are cultivated for ornament and medicinal attributes are reported for several taxa.

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GARRYA

Garrya Douglas ex Lindl., Edwards's Bot. Reg. 20:t. 1686. 1834.—Type: *Garrya elliptica* Dougl. ex Lindl.

Fadyenia Endl., Gen. Pl. Suppl. 4:38. 1848, non W.J. Hooker (1840).—Type: *Fadyenia hookeri* Endl. (≡ *Garrya fadyenii* W. Hook.).

Characters of the family.

1. **Garrya laurifolia** Hartw. ex Benth., Pl. Hartw. 14. 1839.

—*Fadyenia laurifolia* (Hartw. ex Benth.) Endl., Gen. Pl. Suppl. 4:38. 1848.—Type: Mexico, Guanajuato, W of Guanajuato, 1839, *T. Hartweg 81* (K ex hb. Benth., as photocopy!; isotypes: GH, K ex hb. Benth.–photocopy!, NY). Specific locality information for Hartweg's collection was not provided in the protologue. The locale noted above is based on information written in Bentham's hand on the holotype and isotype in Bentham's herbarium at Kew. Two specimens in the Hooker herbarium at Kew (*Hartweg 81* and *Hartweg 81bis*) bear the locality "Zacatecas," in a handwriting not attributable to Bentham. Although these latter specimens were annotated by Dahling as isotypes, they are likely not duplicates of the type specimens in Bentham's herbarium because they appear to have come from a different locality.

Garrya macrophylla Hartw. ex Benth., Pl. Hartw. 50. 1840. *Fadyenia macrophylla* (Hartw. ex Benth.) Endl., Gen. Pl. Suppl. 4:38. 1848. *Garrya laurifolia* var. *macrophylla* (Hartw. ex Benth.) Wangerin, Pflanzenr. 4, 56a:16. 1910. *Garrya laurifolia* subsp. *macrophylla* (Hartw. ex Benth.) Dahling, Contr. Gray Herb. 209:97. 1978.—Type: Mexico, Hidalgo, Barranca del Encarnación, near Zimapan, 1839, *T. Hartweg 50* (K).

Garrya oblonga Benth., Pl. Hartw. 51. 1840. *Fadyenia oblonga* (Benth.) Endl., Gen. Pl. Suppl. 4:38. 1848. *Garrya laurifolia* var. *oblonga* (Benth.) Wangerin, Pflanzenr. 4, 56a:16. 1910.—Type: Mexico, Hidalgo, near Regla, 1839, *T. Hartweg 385* (K).

Garrya racemosa Ramírez, Datos para la Materia Médica Mexicana 1:184. 1895 ("1894"). *Garrya laurifolia* subsp. *racemosa* (Ramírez) Dahling, Contr. Gray Herb. 209:98. 1978.—Type: Mexico, Morelos, Cuernavaca, date, collector, and collector's number unknown (US). No specimen was cited in the protologue, but the species was noted to occur "en Tlalmanalco y otros lugares del Valle de México, en Jalatlaco y Huayacotla." Dahling (1978) indicated that "*Ramirez 431366*" at US was the holotype. Examination of a photograph of the presumed type of this species at US (*http://rathbun.si.edu/botany/types/*) reveals a fragmentary specimen, the label of which indicates "part of type" and provides neither collector nor collection number, but cites Cuernavaca as the place of collection. The number cited by Dahling (1978) is the stamped accession number of the specimen at US, not a collector's number.

Garrya laurifolia var. *lanceolata* Wangerin, Pflanzenr. 4, 56a:16. 1910.—Syntypes: Mexico, state unknown, without locality or date, *Uhde 34* (B), *250* (?). Dahling's (1978) indication that *Uhde 34* at B, which he did not see and which specimen was likely destroyed there in 1943, is the "holotype" might effectively lectotypify this species. He indicated the presence of a duplicate of this collection at B (as "isotype").

Garrya laurifolia var. *quichensis* Donn. Sm., Bot. Gaz.

(Crawfordsville) 54:237. 1912. *Garrya laurifolia* subsp. *quichensis* (Donn. Sm.) Dahling, Contr. Gray Herb. 209:99. 1978.—TYPE: Guatemala, Quiché, San Miguel Uspantán, 1800 m, Apr 1892, *E. Heyde & E. Lux 3175* (US; isotypes: GH, US).

ILLUSTRATIONS: **Fig. 2**; Baillon, The Natural History of Plants, vol. 7:74. 1881; Bot. Jahrb. Syst. 38 (Beiblatt 86):53, 57. 1906; Pflanzenreich IV, 56a:4, 5. 1910; Trans. Linn. Soc. London, Bot., ser. 2, 8(7):t. 28, figs. 22–25. 1914; Fieldiana, Bot. 24(1,2):71. 1966; Fieldiana, Bot. 40:19. 1977; Flora de Veracruz 33:3. 1983.

Shrubs or small trees to 9.1 m tall. Young stems lenticellate, quadrate-ridged and ± evenly pubescent with antrorse to antrorsely appressed trichomes 0.2–0.6 mm long, becoming subterete with irregular ridges and more sparsely pubescent to glabrate. Leaves petiolate, petioles to 18 mm long, blades coriaceous, elliptic to obovate, 29–135 mm long, 8–47 mm wide, 1.8–4.4 times longer than wide, rounded to acute and minutely apiculate at apex, acute to subattenuate at base, adaxial surface shiny, pubescent with flexuose to antrorsely appressed trichomes or glabrate, veins not or but slightly impressed, abaxial surface dull, pubescent with flexuose to antrorsely appressed trichomes or glabrate, margin sometimes ± revolute. Inflorescences of axillary or terminal spikes to racemes or panicles of spikes to racemes, rachis ridge-angled. Male inflorescences with rachis ± densely pubescent with (flexuose to) antrorse or upward-pointing trichomes; bracts broadly triangular to ovate-lanceolate, erect, those at a node basally connate, 2.7–6 mm long, 2–2.8 mm wide, abaxially pubescent like rachis; male flowers 1 (–3 or more) per bract, flowers or flower clusters opposite at inflorescence nodes, sessile to subsessile (i.e., borne on pedicels to 2 mm long); sepals ± linear, 2.5–4 mm long, 1–1.5 mm wide, usually remaining connate (or connivent) at apex; stamens with filaments inconspicuous, thecae 1.8–2.3 mm long. Female inflorescences with rachis pubescent with flexuose to antrorse to upward-pointing trichomes or glabrate; bracts linear to triangular to lanceolate to obovate to oblanceolate, often reflexed in fruit, those at a node connate at base, 2.5–17 mm long, 1.2–4 mm wide, or sometimes foliose and up to 65 mm long and 20 mm wide (or with proximal bracts foliose and distal bracts reduced), abaxially pubescent like rachis or glabrate; female flowers solitary, opposite at inflorescence nodes (or solitary and terminal), sessile or borne on pedicels to 6 mm long (terminal flowers borne on pedicels to 9 mm long); ovary ovoid to subellipsoid, stigmas 1–3 mm long, persistent in fruit. Fruits globose, greenish turning purplish or blackish, sometimes subglaucous, 5–9.5 mm in diameter, sparsely pubescent with appressed trichomes or mostly glabrous or glabrate, surface reticulate-ridged or rugose. Seeds 1–3, hemispheric to wedge-shaped, 4–5 mm long, surface ± rugose, lacking trichomes. Chromosome number unknown. Flowering Nov–Aug; fruiting throughout the year.

Along streams and on slopes in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-*Liquidambar* Forest, and Pine-Oak Forest; common in Central Plateau, uncommon in Sierra Madre; 1300–2900 m. Mex. (Chih., N.L., Tam., Sin., Dgo., Zac., S.L.P., Nay., Jal., Aguasc., Gto., Hgo., Mich., Méx., D.F., Mlos., Pue., Ver., Gro., Oax., Chis.), Guat., C.R., Pan. CHIAPAS COLLECTIONS: *A 1389* (DS); *Alex 1105* (MEXU); *Cb 6152* (MEXU), *8025* (MEXU); *Cham 476* (MEXU); *Da 9529* (CAS, MEXU); *Ruiz 135* (CAS); *Ga 350* (MEXU); *GL 106* (MEXU), *148* (MO), *237* (MO), *539* (MEXU); *GG 411* (CAS, MEXU); *La 397* (DS, MEXU), *1263* (DS, MEXU); *L&S 9912* (CAS); *Lo 69* (MO), *112* (MEXU, MO), *346* (MEXU); *Ml 195* (CAS, MEXU); *EM 5006* (MEXU); *M&L 7* (CAS, MEXU); *Mi 2721* (MEXU); *Ne 5599* (CAS, MEXU); *PL 977* (MEXU); *RM 647* (CAS, MEXU); *SC 553* (MEXU), *604* (MEXU), *810* (MEXU); *Te 7258* (MEXU); *T 27* (DS), *614* (DS, MEXU), *1122* (DS, MEXU), *2463* (DS), *5790* (MEXU), *7980* (MEXU), *8453* (MEXU), *8754* (MEXU), *9455* (MEXU, MO); *We 12945* (MEXU, MO), *17957* (MEXU); *6887*, *7020*, *7357*, 7524, *7961*, *8146*, *9230*, *9320*, *9380*, *9527*, *9661*, *10936*, *12170*, *21225*, *31838*, *34751*, *47767*, *49765*, *50283*, *51231*, *51544*, *53689*.

Local names: "bik'tal ik'al" (Tzeltal, *Pérez L. 997*), "ijk'al winik" (Tzeltal, *Gómez L. 148*, *237*, *López P. 112*), "tza'los te'" (Tzeltal, *López P. 69*), "tzara ojkotz te'" (Tzeltal, *Sántiz C. 553*), "winiktez" (Tzeltal, *Ton 5790*).

Uses: Standley (1924) noted that the bark of this species is very bitter and Dahling (1978) listed four alkaloids identified therefrom. Standley (1924) also noted that the bark is much used in Mexico as a remedy for diarrhea; fruits are used as a remedy for coughs (*Sántiz C. 604*, *810*); leaves used in a bath for feverish chills (*López P. 112*); unripe fruits boiled, mixed with sugar, and drunk for "enfermedad de los pollos" (*Sántiz C. 553*); leaves administered in a bath for edema (*López P. 69*, *Gómez L. 148*, *Gómez L. 237*); pollen used in "aplastado" for rabies (*Pérez L. 997*).

Flowers are usually solitary in the axils of the

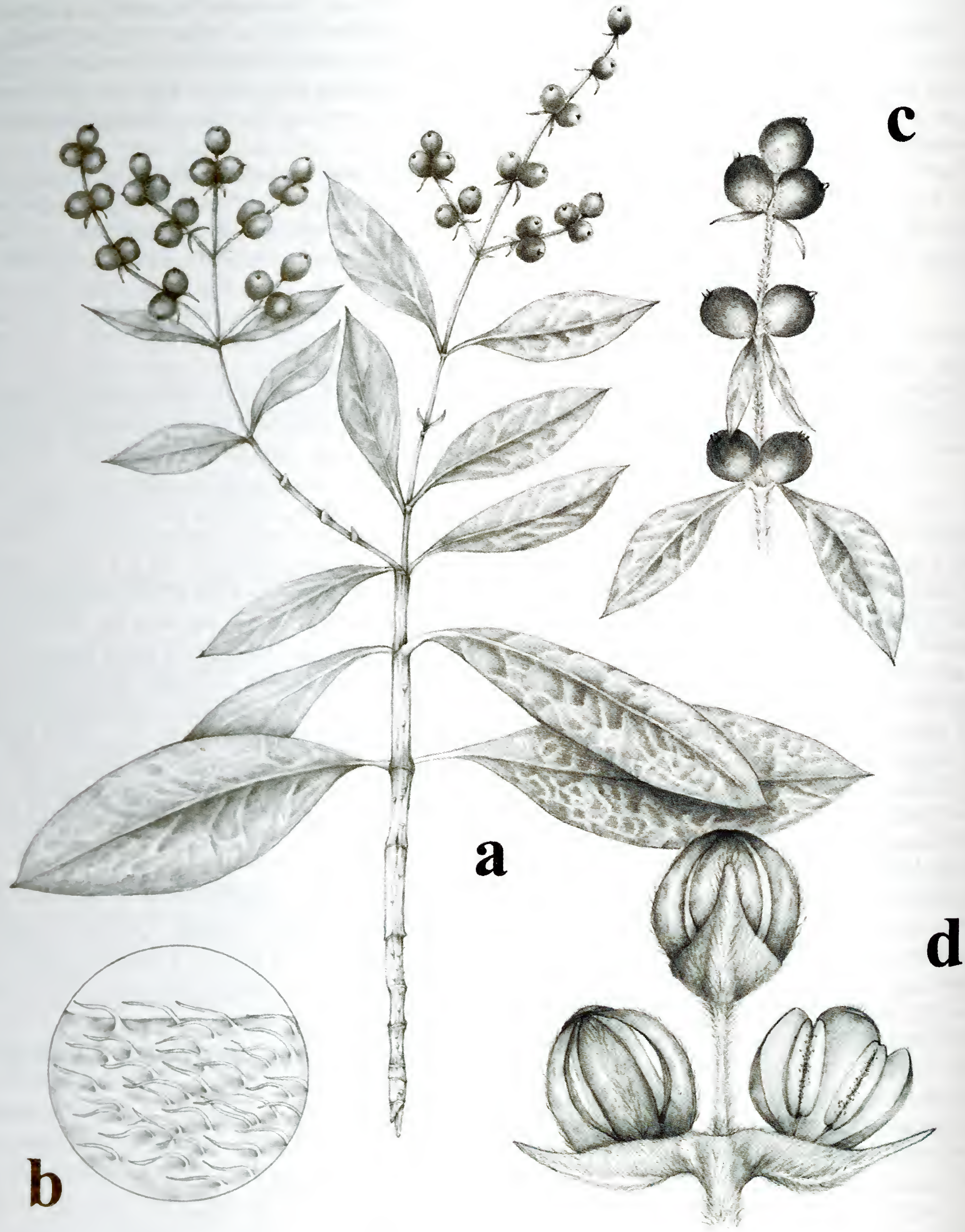

FIGURE 2. *Garrya laurifolia*. a. habit (*Martínez I. et al. 195*), × 0.55; b. abaxial surface of leaf (*Martínez I. et al. 195*), × 22; c. nodes of male inflorescence with male flowers, flower at right with a sepal and two anthers removed (*Breedlove & Almeda 47767*), × 6; d. female inflorescence (*Davidse 9529*), × 1.1. Drawn by Nadia Strasser.

bracts, but sometimes evidence of a dichasial arrangement of flowers is observed. Occasionally, bracteoles are observed subtending the flowers and sometimes a partial dichasium is present with a central flower and another flower borne in its axil which is subtended by a pedicel, two bracteoles and a peduncle (e.g., male flowers of *Breedlove 50283*).

This species is morphologically variable throughout its extensive range. Dahling (1978) recognized four subspecies of *Garrya laurifolia* based primarily on overlapping characters involving leaf shape, size, and pubescence. He treated plants from Chiapas under *G. laurifolia* subsp. *quichensis*. Espejel (1983) noted the difficulties in recognizing subspecies of *G. laurifolia* among plants in Veracruz.

KRAMERIACEAE

Thomas F. Daniel

Department of Botany
California Academy of Sciences
875 Howard Street
San Francisco, California 94103

Perennial herbs to shrubs, stems sometimes intricately branched or becoming thornlike. Leaves alternate, exstipulate, simple or 3-foliolate, sessile to petiolate; blades entire. Flowers solitary in axils of leaves or in axils of reduced and bractlike distal leaves (resulting in terminal racemelike inflorescence or when branched, appearing paniclelike), bisexual, zygomorphic, stalked; flower stalks consisting of a peduncle (proximally) and a pedicel (distally) separated by 2 opposite bracteoles; calyx showy, consisting of 4–5 sepals, sepals free, unequal in size, reflexed or spreading or nearly enclosing the rest of the flower during anthesis, lowermost sepal sometimes geniculate and/or saccate, all sepals uniformly pinkish or purple or with upper sepals pink and lower sepals white or with four upper sepals yellow and the single lower sepal pinkish; petals (4–) 5, small and inconspicuous, dimorphic, lower 2 petals reduced to sessile and fleshy glands (eliaphores) borne on either side of the ovary, pink or purple or yellow or orange-brown, upper (2–) 3 petals petaloid, usually clawed, free or basally connate, entirely pinkish to purple or with pinkish to purple blades and green or white claws; stamens (3–) 4, inserted at junction of upper petals and ovary or on connate portion of upper petals, if 4 then paired (sometimes didynamous), if 3 then with 2 below and 1 above, filaments stout, anthers 2-thecous, tubular, of same diameter as filaments, dehiscing by a terminal pore; pollen striate, 3-colporate, 3-porate, or synporate; ovary superior, 2-carpellate (1 carpel abortive), unilocular, ovules 2, anatropous, bitegmic. Fruit dry, nutlike (or sometimes splitting longitudinally and then capsulelike), subglobose, pubescent, covered with slender to stout prickles (rarely absent). Seed 1, globose, smooth, lacking endosperm. ($x = 6$).

The family consists of a single genus with 17 species distributed from the southern United States (ca. lat. 38°N) to central Chile (ca. lat. 37°S). The greatest concentration of species is found in dry regions of eastern Mexico. Plants of *Krameria* (as reported in seven species) are hemiparisites that form root connections with a diverse assemblage of herbaceous and woody plants (Simpson 1989). Elaiophores in the flowers secrete fatty oils that are collected by female anthophorid (*Centris* spp.) bees, which effect pollination (Simpson 1989). *Krameria* has been treated at times in the Fabaceae and Polygalaceae, but in recent years, a unigeneric Krameriaceae has been nearly universally recognized. Molecular sequence data from both chloroplast and nuclear ribosomal DNA indicate that Zygophyllaceae are sister to Krameriaceae and that these two families comprise an isolated clade that is sister to the large "eurosid I" clade (Soltis et al. 2000). The family is of minor economic importance as a source of a yellow or reddish dye and extracts from *Krameria* are sometimes used in dental preparations (toothpastes and mouth washes). The dried roots (rhatany roots) of some species have been used medicinally to treat chronic diarrhea and numerous other ailments (see Simpson 1989). The primary active ingredients in the roots are tannins, which yield both the dyes and astringent properties associated with medicinal uses.

ACKNOWLEDGMENTS

I thank The American Philosophical Society for a Franklin Grant in 2003 that permitted me to study collections at MEXU and MO, and Sheva Hill Myers for her handsome drawing of the species.

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KRAMERIA

Krameria Loefl., Inter Hispan. 195. 1758.—TYPE: *Krameria ixine* Loefl.

Landia Dombey, J. Sçavans (Paris) 1784/1:382. 1784.—TYPE: *Landia lappacea* Dombey (≡ *Krameria lappacea* (Dombey) Burdet & B.B. Simpson).

Dimenops Raf., Atl. J. 144. 1832.—TYPE: *Dimenops lanceolata* (Torr.) Raf. (≡ *Krameria lanceolata* Torr.).

Ixina Raf., Atl. J. 144. 1832, nom. illegit. (superfluous when published).

Stemeiena Raf., Atl. J. 144. 1832.—TYPE: not designated fide Farr et al. (1979); *Krameria triandra* Ruíz & Pav. (= *Krameria lappacea* (Dombey) Burdet & B.B. Simpson) fide Simpson (1989).

Characters of the family.

1. **Krameria revoluta** O. Berg, Bot. Zeitung (Berlin) 14:751. 1856.

—LECTOTYPE: Mexico, Oaxaca, between Tehuantepec and the Pacific Ocean, Sep, *G. Andrieux 527* (G; isolectotypes: F, K, P, W).

Krameria dichrosepala Donn. Sm., Bot. Gaz. (Crawfordsville) 49:453. 1910.—TYPE: Guatemala, Zacapa, Gualán, C. *Deam 6273* (US; isotypes MICH, NY, US).

Krameria collina Brandegee, Univ. Calif. Publ. Bot. 6:182. 1915.—TYPE: Mexico, Oaxaca, Cerro de Picacho, Jul 1914, C. *Purpus 7160* (UC; isotypes: A, B, BM, F, G, GH, MO, NY, US).

ILLUSTRATIONS: **Fig. 3**; Fl. Neotrop. 49:68. 1989.

Prostrate to suberect perennial herbs or weak shrubs to 1.2 m. Young stems ± densely pubescent with antrorse to antrorsely appressed trichomes 0.5–1.2 mm long (strigose). Leaves simple, sessile, linear to lanceolate, 4–15 mm long, 0.7–2.5 mm wide, 3.8–11.7 times longer than wide, acute and apiculate (apiculum dark, up to 0.7 mm long) at apex, ± cuneate at base, surfaces pustulate, strigose or glabrate, margin ± revolute. Flowers borne in leaf axils or in axils of reduced (bractlike) leaves forming terminal racemelike axes to 7 cm long; flowers solitary, borne on stalks 1–9 mm long, flower stalks (see discussion) strigose, bearing a pair of opposite bracteoles along their length and usually consisting of both a peduncle (i.e., stalk between node and bracteoles) and a pedicel (i.e., stalk between bracteoles and flower), bracteoles foliose (although usually smaller than leaves). Sepals 4 (–5), yellow or orange, turning red with age, externally strigose where exposed in bud, the lower sepal largest, geniculate, subsaccate, 6–8.5 mm long, 2.5–3.7 mm wide, upper 3 (–4) sepals subequal, subelliptic, 5.5–7 mm long, 1.8–3 mm wide. Petals 5, lower fleshy pair sublenticular, 1.8–2.5 mm in diameter, upper 3 petals basally connate, blades yellow, clawed, 1.5–1.7 mm long, 1.2–2 mm wide. Stamens 4, adnate to the fused (basal) portion of upper petals, 2–2.5 mm long, thecae 0.9–1.2 mm long, apically flared and erose following dehiscence. Ovary densely pubescent, style 3–3.6 mm long. Fruit (including prickles) 4–8 mm in diameter, densely pubescent and covered with stout prickles, prickles reddish, 0.5–3 mm long, proximally pubescent like fruit, distally and apically beset with retrorse barbs. Chromosome number unknown. Flowering: Jun–Dec; fruiting: Jun–Oct.

Dry, brushy slopes, wooded slopes, and shrubby plains in Tropical Deciduous Forest, Thorn Woodland, Short-tree Savanna, and Second-growth; common in

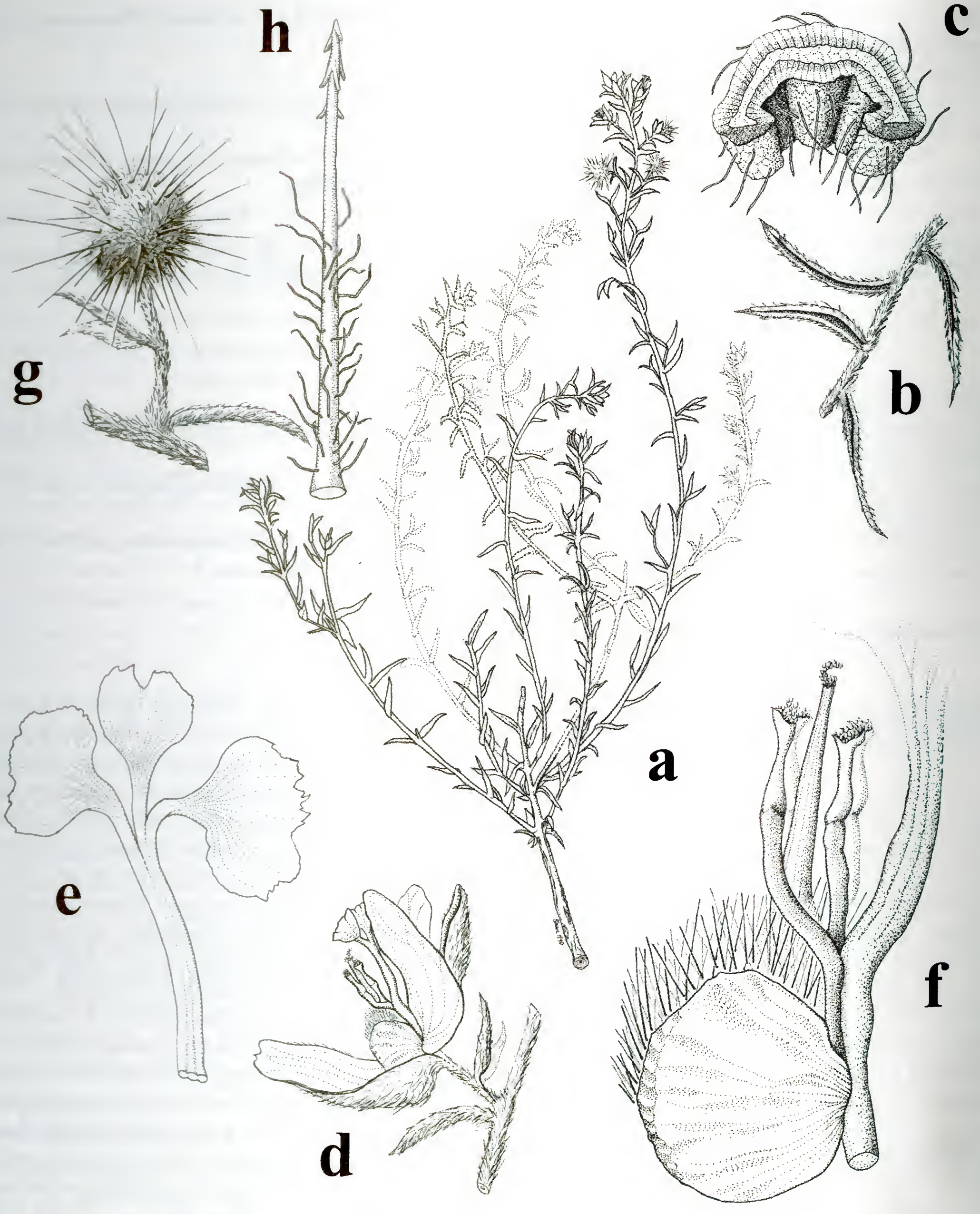

FIGURE 3. *Krameria revoluta*. a. habit (*Daniel et al. 5856*), ×0.5; b. segment of stem with leaves (*Breedlove 20076*), ×1.5; c. cross-section through a leaf (*Breedlove 20076*), ×14; d. flower subtended by pedicel, bracteoles, peduncle, and bractlike leaf (*Breedlove 51866*), ×3.5; e. Upper three petals (*Breedlove 51866*), ×12.5 ; f. base of upper three petals with stamens adnate, one of the lower (sublenticular) petals appressed to pubescent ovary with style (*Breedlove 51866*), ×14; g. fruit with prickles (*Daniel et al. 5856*), ×3; h. prickle (*Daniel et al. 5886*), ×16. Drawn Sheva Hill Myers.

Central Depression, rare in Central Plateau; 100–1575 m. Mex. (Ver., Oax., Chis.), Guat., Nic., C.R. CHIAPAS COLLECTIONS: *Da 9546* (MO); *Fa 1008* (MEXU); *La 1123* (DS), *1637* (DS), *2697* (DS, MEXU), *2868* (DS); *Mi 3885* (MEXU); *P 9014* (MO); *Sim 7075* (MEXU); *T 7779* (MEXU); *V&S 56-16* (CAS); *10414*, *20076*, *30514*, *36608*, *36861*, *51866*.

The bibracteolate flower stalks of this and other species of *Krameria* are suggestive of a reduced (i.e., single-flowered) dichasium; hence the inflorescence might be considered to be a highly reduced thyrse. Variation in position of the bracteoles on the flower stalks is evident among Chiapan plants. When they are located at the base of the stalk, the peduncle is absent, and when they are located at the apex of the stalk, the pedicel is absent. They are usually located some distance from either the apex or base of the stalk so that both peduncle and pedicel are present.

Krameria revoluta is one of only two species in the genus with yellowish flowers (according to specimen label data among Chiapas plants, sepals are yellow or orange and turn reddish with age; color of the upper petal blades is based on Simpson, 1989). The other species with yellowish flowers, *K. pauciflora* Moc. & Sessé ex A. DC. (which generally occurs in more northerly regions of Mexico), was considered by Simpson (1989) to be its closest relative.

STYRACACEAE

Peter W. Fritsch

Department of Botany
California Academy of Sciences
875 Howard Street
San Francisco, California 94103

Trees or shrubs with stellate or peltate trichomes. Leaves alternate, estipulate, petiolate, blades simple, pinnately nerved. Inflorescences lateral and/or pseudoterminal cymes, racemes, or panicles, or sometimes 1–2-flowered, usually bracteolate. Flowers bisexual or rarely pistillate in gynodioecious species, actinomorphic, with hypanthium adnate to ovary wall at various levels, usually ± pendent. Calyx synsepalous, truncate or (2–)4–5(–9)-toothed, aestivation valvate or open. Corolla sympetalous, (4–)5(–10)-lobed or -parted, aestivation imbricate or subinduplicate-valvate, generally campanulate with the lobes spreading to reflexed. Stamens usually twice, rarely up to four times or equal the number of corolla lobes, uniseriate, replaced by 5 staminodes in pistillate flowers. Filaments usually flattened at least at the base, inserted on corollas, sometimes forming a tube proximally. Anthers basifixed, introrse, 2–locular, tetrasporangiate, longitudinally dehiscent, oblong to linear, the connective roughly equal to or surpassing the thecae. Ovary partly to completely inferior, 2–4(–5)-carpellate, 2–4(–5)-septate at the base but usually 1–locular through the distal attenuation of the septa with (1–)4–9(–ca. 30) anatropous, unitegmic or bitegmic tenuinucellate ovules per carpel. Placentation essentially axile. Style 1, filiform or subulate, usually hollow. Stigma terminal, truncate or minutely lobed. Fruits mostly dry and capsular with loculicidal dehiscence, or indehiscent and sometimes samaroid, or drupaceous, with persistent calyx. Seeds 1–4(–ca. 50), ± globose to fusiform, rarely winged. Testa brown, thin to indurate. Cotyledons flattened or nearly terete. Endosperm copious, oily.

Genera 11, species ca. 160 (one genus, seven species in Chiapas): North and South America, Southern Europe, Eastern and Southeast Asia, and Malesia, in humid tropical and mesic to semi-arid warm-temperate regions.

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STYRAX

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Strigilia Cav., Diss. 7:358. 1789.—TYPE: *Strigilia racemosa* Cav. (≡ *Styrax racemosus* (Cav.) A.DC.).

Cyrta Lour., Fl. cochinch. Ed. 1:278. 1790.—TYPE: *Cyrta agrestis* Lour. (≡ *Styrax agrestis* (Lour.) G. Don).

Foveolaria Ruiz & Pav., Fl. peruv. prodr. 57. 1794. —*Tremanthus* Pers., Syn. pl. 1:467. 1805.—LECTOTYPE (Fritsch 1999, p. 373): *Foveolaria ferruginea* Ruiz & Pav. (≡ *Styrax foveolaria* Perkins).

Adnaria Raf., Fl. ludov. 56. 1817.—TYPE: *Adnaria odorata* Raf.

Epigenia Vell., Fl. flumin. 183. 1829.—LECTOTYPE: (Fritsch 1999, p. 373): *Epigenia integerrima* Vell. (= *Styrax glabratus* Schott).

Pamphilia Mart. ex A.DC., in DC., Prodr. 8:271. 1844.—LECTOTYPE (Hutchinson, The genera of flowering plants. 39. 1967): *Pamphilia aurea* Mart. ex A.DC. (≡ *Styrax maninul* B. Walln.).

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Anthostyrax Pierre, Fl. forest. cochinch. sub t. 260. 1892.—Type: *Anthostyrax tonkinense* Pierre (≡ *Styrax tonkinensis* (Pierre) Craib ex Hartwich).

Evergreen or deciduous trees or shrubs. Bark smooth or fissured, gray to brown. Outer layer of older twigs fibrous, dull brown or more often gray, inner layer dull maroon. Buds superposed, lepidote or stellate-pubescent, with a single outer scale. Vesture consisting of scales, stalked or unstalked stellate or dendroid hairs, and/or sessile or stalked glandular hairs. Leaves with the margins entire, lobed, or coarsely toothed, glandular-denticulate or glandular-serrate. Inflorescences bracteolate, lateral and pseudoterminal (ours), essentially cymose in construction but often appearing racemose, sometimes two or more arising from the same node (or a single inflorescence branched at the base), sometimes 1–2-flowered, then usually lateral. Flowers bisexual (ours) or rarely pistillate in gynodioecious species, fragrant, with a short hypanthium adnate to the basal third or less of the ovary wall, usually ± pendent. Calyx campanulate or cupuliform, teeth (2–)4–6 or absent. Corolla sympetalous for ca. 2 mm or more, aestivation subinduplicate-valvate or imbricate, white or pink (ours), or rarely yellow, the 5(–10) lobes almost always longer than the tube. Stamens (5–)10 when the number of corolla lobes = 5, up to twice the number of the corolla lobes when the number of lobes > 5, if 10 then uniseriate but often appearing biseriate in bud, the 5 inner, sepalad stamens often exceeding the 5 outer, petalad stamens at the distal end of the androecium, if 5 then all stamens sepalad. Free portion of filaments sometimes forming a tube for some distance but always distinct distally, the ventral side of the distinct portion glabrous to stellate-pubescent or lepidote and sometimes with two juxtaposed and longitudinally oriented auricles, these often obscured by a dense indument. Ovary partly inferior (appearing nearly superior), 3-carpellate, 3-septate at the base but 1-locular through the distal attenuation of the septa. Style filiform or rarely subulate. Stigma terminal. Ovules (1–)ca. 3–8 per carpel, bitegmic. Fruit a drupe, a capsule dehiscent via 3 valves, or nut-like (dry and indehiscent), globose or ellipsoid, 1(–3)-seeded, with persistent calyx. Exocarp and endocarp thin, mesocarp juicy or dry. Seed subglobose, depressed-globose, or ellipsoid, brown, completely filling the fruit cavity, with a broad hilum. Seed coat indurate, usually smooth (ours) except for 3(–6) longitudinal grooves, sometimes also finely reticulate-fissured to irregularly rugose, or pubescent. Endosperm copious. Embryo straight. Cotyledons flattened. $\underline{x} = 8$.

About 130 species, 85 or so from United States to Argentina, one in eastern Mediterranean, remainder in Eastern Asia, Southeast Asia, and Malesia.

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a. Corolla lobes imbricate in bud, partly overlapping at anthesis; fruit dry, indehiscent or dehiscent via three valves; leaves membranaceous (*Styrax* sect. *Styrax* ser. *Cyrta*) . . . . .3. *S. glabrescens*
aa. Corolla lobes valvate in bud, non-overlapping at anthesis; fruit a drupe; leaves chartaceous or thick chartaceous (*Styrax* sect. *Valvatae* ser. *Valvatae*).
  b. Anthers (5–)6–8 mm long; arms of the hairs nearest the distal end of the ventral side of the distinct portion of the stamen filaments predominantly pointing upward, some of these up to (0.8–)1–2 mm long; connectives distinctly prolonged beyond the distally tapered anther sacs; corolla lobes chartaceous. . . . . .1. *S. argenteus*
  bb. Anthers 1.7–5 mm long; arms of the hairs or scales nearest the distal end of the ventral side of the distinct portion of the stamen filaments not predominantly pointing upward, typically ≤ 0.5 mm long; connectives not or only slightly prolonged beyond the distally non-tapered anther sacs; corolla lobes subcoriaceous.
    c. Abaxial laminar surface and calyx with vesture of peltate or lacerate-margined scales; scales at mid-calyx 0.33–0.42 mm diam. . . . . .2. *S. conterminus*
    cc. Abaxial laminar surface with vesture of stellate hairs, or rarely radiate scales or nearly glabrous; scales at mid-calyx 0.05–0.33 mm diam., or else lacking.
      d. Vesture just below mid-calyx of stellate hairs.
        e. Larger fruits 15–20 mm long; style glabrous or pubescent at base only; lamina usually

obovate, sometimes broadly elliptic, 15.5–22.5 mm long; distinct portion of stamen filament 1–1.2 mm long; corolla subcoriaceous . . . . .4. *S. magnus*

ee. Larger fruits 9–13 mm long; style pubescent from base to 40–85% of the total length; lamina broadly ovate-oblong or elliptic, sometimes lanceolate or suborbicular, (8.5–)11–15(–24) mm long; distinct portion of stamen filament 2.5–3.5 mm long; corolla chartaceous . . . . .5. *S. radians*

dd. Vesture just below mid-calyx of radiate scales.

f. Vesture on the outer distal third of the corolla lobes of stellate hairs; anthers 3–4.8 mm long, 1.9–5.3 times as long as the distinct portion of the filaments; lamina (10.1–)11–22.5 cm long . . . . .6. *S. ramirezii*

ff. Vesture on the outer distal third of the corolla lobes of radiate scales; anthers 1.7–3.6 mm long, 1.1–2.2 times as long as the distinct portion of the filaments; lamina 5.2–12.5(–16) cm long . . . . .7. *S. warscewiczii*

1. Styrax argenteus C. Presl, Reliq. haenk. 2:60. 1831–1835.

—*Strigilia argentea* (C. Presl) Miers, Ann. Mag. Nat. Hist., ser. 3, 3: 282. 1859.—TYPE: Mexico, Guerrero, "ad portum et urbem Acapulco," *Haenke s.n.* [or *148*; *Perkins 1907*] (PR; isotypes: F!, MO!, W!).

Styrax polyanthus Perkins, Bot. Jahrb. Syst. 31:479. 1902.—LECTOTYPE (D'Arcy, Ann. Missouri Bot. Gard. 66:169. 1979): Guatemala, "prope Guatemala", Feb 1890, *Donnell Smith 2266* (US!; isolectotypes: F!, GH!).

Styrax myristicifolius Perkins, Bot. Jahrb. Syst. 31:481. 1902.—LECTOTYPE (Standley and Williams, Fieldiana, Bot. 24[3]:260. 1967): Guatemala, Santa Rosa, Las Viñas, Sep 1894, *Heyde and Lux 6182* (F!; isolectotypes: GH!, MO!, NY!, US!).

ILLUSTRATIONS: Fritsch 1997, figs. 15–16.

Evergreen tree to 20(–30) m. Young twigs grayish yellow-, yellowish brown-, light brown-, or orange-brown-stellate-pubescent, outer layer of older twigs not exfoliating. Petiole 10–25 mm long. Lamina chartaceous, 6.5–18 × 2.4–7.5 cm, ovate, lanceolate, narrowly or broadly elliptic, or rarely slightly oblanceolate, secondary veins 9–11 on each side of midvein, apex acute to acuminate, base cuneate to rounded, often slightly attenuate, abaxially covered with minute grayish green stellate hairs and often also larger soft, grayish green or yellowish brown stellate hairs, the minute hairs usually absent from the primary through tertiary veins, thus the vein surface easily visible, margin entire. Inflorescences racemose or rarely paniculate, the racemes or panicle branches 3–14 cm long, 3–22-flowered. Calyx 2.5–5 × (3.5–)4–6(–7) mm, cupuliform or broadly cupuliform, grayish green-stellate-pubescent. Calyx teeth 5, to 0.5 mm long, deltoid. Calyx margin truncate or rarely slightly concave between the teeth. Corolla white, 10–16 mm long. Petals usually connate up to the calyx margin, rarely to 2 mm distally beyond. Corolla lobes 5, valvate in bud, 8–14 × 1.7–2.3 mm, non-overlapping, widely spreading or recurved, chartaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of stellate hairs. Stamen tube 0.7–1 mm long. Distinct portion of filament 2–2.5 mm long, of equal width throughout, ventrally with small auricles bearing a dense mass of white stellate stiff hairs with at least some arms 1–2 mm long, the hairs nearest the distal end of the filament with arms predominantly pointing upward, also pubescent below the auricles and at the sinus between adjacent filaments. Anthers (5–)6–8 mm long, the connectives distinctly prolonged beyond the distally tapered anther sacs. Ovary densely stellate-hirsute. Style glabrous or pubescent at base only. Drupe 13–18 × 8–14 mm (wider when 2-seeded; does not include occasional beak), ellipsoid or ovoid-ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering Aug–Mar; fruiting Oct–May.

Banks of waterways, moist ravines, dry limestone ridges, forest edges in Tropical Rain Forest, Evergreen Seasonal Forest, Tropical Deciduous Forest, Pine-Oak Forest, Second-growth and Successional Forest, and Shrub Associations; uncommon in Northern Highlands, common in Central Plateau, common in Central Depression, uncommon in W Sierra Madre; 700–2000 m. Mex. (Gro., Oax., Chis.), Guat., Bel., Hond., Salv., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Bau 531* (MICH, US); *Be 25* (MEXU); *Bo 8222* (F); *Cz 9902* (F); *Ce 1986* (CAS, MEXU, MO, NY); *G 620* (GH, MO); *Go 872* (US); *G-V 4053* (WIS); *J 1598* (F); *Lav 4591* (MEXU, NY, TEX); *EL 7555* (DS, MEXU); *EM 5215* (LL, MEXU); *Mi 5295* (MEXU); *Mi 5927* (MEXU); *Pa 34* (CAS); *Pa 1442* (CAS); *P s.n.*, May 1925 ("with 10057") (NY, US); *P 46* (US); *P 10531* (GH); *P 13001* (MICH); *P 14301* (A); *Rey 356* (MEXU); *Rey 463*

(MEXU); *Sou 11635* (MEXU, MO); *Ten 5707* (MEXU, MO); *T 404* (DS, WIS); *T 3431* (DS, DUKE, F, MICH); *T 6494* (MEXU, MO); *BV 3–11* (CAS, MO); *BV 5–3* (CAS); *BV 16–9* (DS); *6366*; *6439*; *7619*; *14085*; *20577*; *20635*; *21943*; *23352*; *25152*; *28487*; *29307*; *29696*; *30255*; *32773*; *33804*; *39966*; *42421*; *46979*; *48026*; *50206*; *50712*; *51000*.

2. Styrax conterminus Donn. Sm., Bot. Gaz. 18:5. 1893.

—TYPE: Guatemala, Quiché, San Miguel Uspantán, Apr 1892, *Heyde & Lux 2915* (US!; isotypes: B [destroyed], GH!, HRCB, M, MO!, NY!).

ILLUSTRATIONS : **Fig. 4**; Gonsoulin 1974, fig. 12; Fritsch 1997, figs. 33–35.

Evergreen tree to 18 m. Young twigs lepidote, the scales brown mixed with olive-green, outer layer of older twigs not exfoliating. Petiole 13–25 mm long. Lamina thick-chartaceous, 8.5–16.5 × 2.7–5 cm, narrowly elliptic or narrowly oblong, secondary veins 11–13 on each side of midvein, apex acuminate, base cuneate to slightly attenuate, ours abaxially covered (surface and veins) with olive-green peltate or lacerate-margined scales and more scattered orange-brown scales or rarely nearly glabrous, margin entire. Inflorescences racemose or paniculate, racemes or panicle branches 3–5.5 cm long, 4–9-flowered. Calyx 3–4 × 4–5.5 mm, conical, olive-green-, light brown-, or orange-brown-lepidote, scales at mid-calyx 0.33–0.42 mm diam., peltate or lacerate-margined. Calyx teeth 5, to 0.7 mm long, deltoid. Calyx margin slightly concave or rarely truncate between the teeth. Corolla white or pink, 10–13 mm long. Petals connate 2–4 mm beyond the calyx margin distally. Corolla lobes 5, valvate in bud, 7–10 × 3 mm, non-overlapping, erect or spreading, subcoriaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of peltate or lacerate-margined scales. Stamen tube 2–3 mm long. Distinct portion of filament 1–2 mm long, of equal width throughout, ventrally not auriculate, sparsely radiate-lepidote at the somewhat incurved filament margins, glabrous on the face, the scales with arms to 0.4 mm long. Anthers 3.5 mm long, the connectives not or only slightly prolonged beyond the distally non-tapered anther sacs. Ovary lepidote. Style glabrous or pubescent at base only. Drupe 12–15 × 7–9 mm, ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering Apr–Jun, Dec; fruiting Jan, Feb, Jun, Aug.

Evergreen Cloud Forest, Pine-Oak Forest; uncommon in Sierra Madre; 2300–2800 m. Mex. (Oax., Chis.), Guat., Hond., Salv. CHIAPAS COLLECTIONS: *EM 15507* [*5507*] (CAS, F, LL, NY); *P 7422* (GH, NY); *68928*; *72698*.

An individual of this species with nearly glabrous leaves abaxially has been collected from Oaxaca (*Maya 2450* [CAS!]). Plants with this type of morphology can be expected to occur in Chiapas, in which case the presence of peltate or lacerate-margined scales on the calyx should serve adequately for identification.

3. Styrax glabrescens Benth., Pl. hartw. 66. 1840.

—TYPE: Mexico, Oaxaca [Chinantla region], planitie Llano Verde, *Hartweg 489* (K!; ISOTYPE: LD).

Styrax guatemalensis Donn. Sm., Bot. Gaz. 15:27. 1890.—TYPE: Guatemala, Alta Verapaz, Sasis, Apr 1889, *Helmrich 1690* (US!; ISOTYPE: GH!).

Styrax glabrescens var. *pilosus* Perkins, in Engl., Pflanzenr. IV. 241 (Heft 30):72. 1907. —*Styrax pilosus* (Perkins) Standl., Contr. U.S. Natl. Herb. 23:1129. 1924.—LECTOTYPE (Fritsch, Ann. Missouri Bot. Gard. 84:727. 1997): Mexico, Oaxaca, Chinantla, May 1844, *Galeotti 2852* (BR!; isolectotypes: BR!, F!, LE, NY!, US!, W!).

Styrax vestitus Lundell, Wrightia 4:121. 1969.—TYPE: Mexico, Chiapas, Concordia, 16 Jun 1945, *Matuda 15922* (LL, as photograph LL!; isotype: F!).

ILLUSTRATIONS: **Fig. 4**; Gonsoulin 1974, fig. 9; Fl. Veracruz fasc. 32:7, fig. 1. 1983; Fritsch 1997, figs. 49–50.

Tree to 30 m. Young twigs densely whitish or yellowish stellate-pubescent or nearly glabrous, often with scattered orange-brown or dark brown stalked stellate hairs toward the base, outer layer of older twigs often exfoliating into long strips. Petiole 6–16 mm long. Lowest leaf pair on each twig often subopposite or opposite. Lamina membranaceous, 3.5–14 × 1.5–10 cm on fertile branches (sometimes smaller and nearly bract-like, laminae of sterile branches nearly always larger [to 21 × 11 cm]), ovate or obovate, sometimes (especially the terminal leaf on sterile twigs) rhombic or suborbicular, secondary veins 6–8 on each side of midvein, lowest leaf pair often ovate-oblong, apex cuspidate to long-acuminate, base narrowly cuneate to rounded, rarely truncate or attenuate, the bases of lowest two leaves often oblique, abaxially covered with white stellate hairs or more often glabrous or nearly so, often with scattered orange-brown or dark brown stalked stellate hairs especially prevalent on veins and the lowest pair

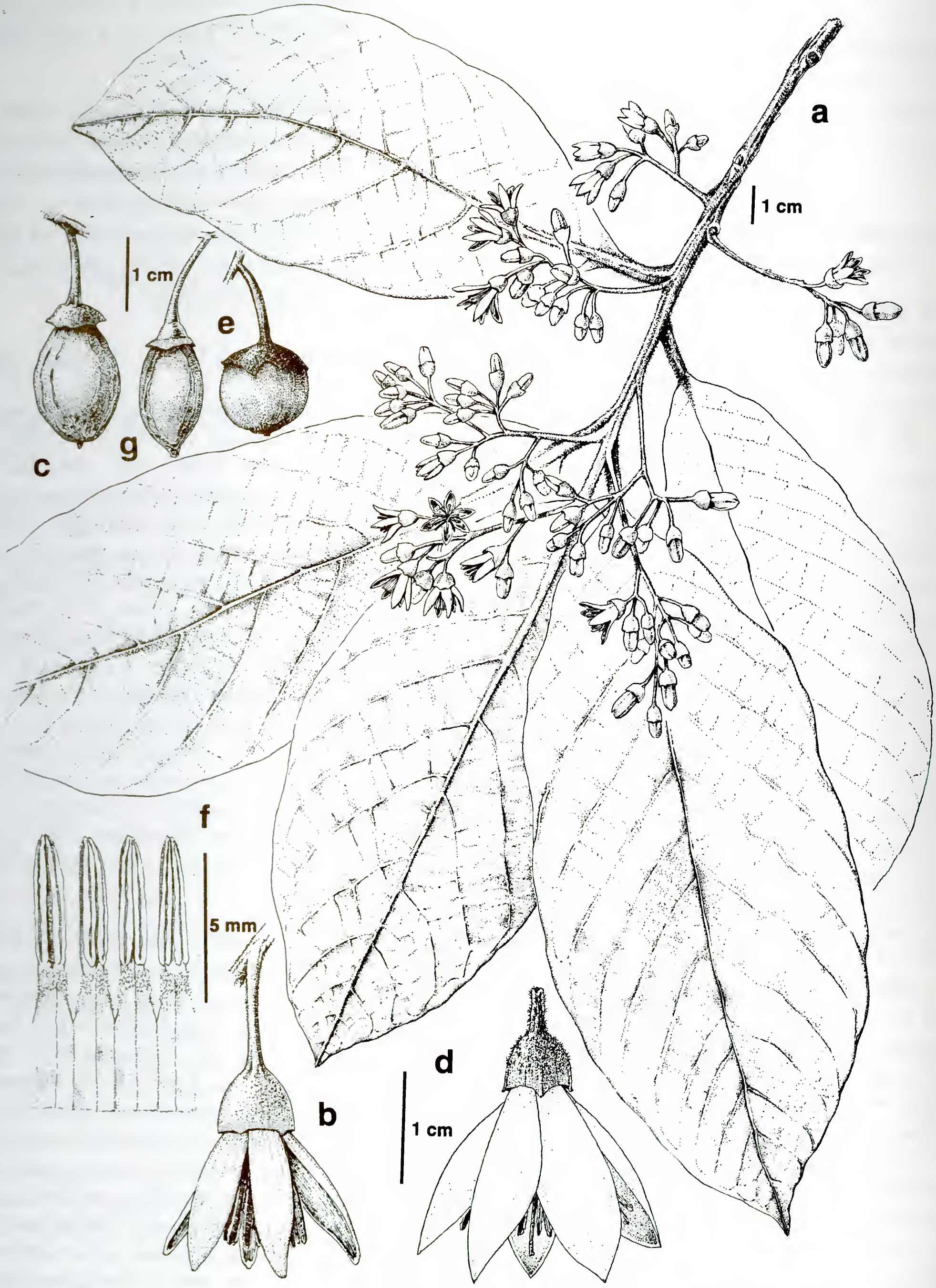

FIGURE 4. *Styrax* spp. a–c. *Styrax magnus* Lundell. a, flowering branch (*68742*); b, flower (*68742*); c, fruit (*46223*). d, e. *Styrax glabrescens* Benth. d, flower (*Calzada 4333*); e, fruit (*Cházaro 1511*). f, g. *Styrax conterminus* Donn. Sm. f, four adjacent stamens (*Sharp 45107* [=*451047*]); g, fruit (*Allen 7184*). Originally published in Annals of the Missouri Botanical Garden, vol. 84 (1997), used with permission.

of leaves on each shoot, the stellate portion often deciduous from the base, the veins glabrous or moderately pubescent, margin serrate or entire but always glandular, the teeth tipped by the glands. Inflorescences racemose or rarely paniculate, lateral racemes 1–5(–17)-flowered, shorter than the pseudoterminal raceme and occurring in the leaf axils immediately below it, sometimes more than one raceme occurring in the same leaf axil, pseudoterminal racemes 2–10.5 cm long, (1)2–12(–21)–flowered. Calyx 4–6 × 4–6 mm, campanulate or broadly cupuliform, grayish green-stellate-pubescent, often also with various amounts of yellow, orange-brown, or dark brown stellate hairs especially toward the base, more thinly pubescent within 1 mm from apex. Calyx teeth 0–7, unevenly distributed, to 0.8 mm long, narrow-deltoid or linear, contiguous or separated by the truncate or slightly concave calyx margin. Corolla white, 14–28 mm long. Petals connate 0–2 mm beyond the calyx margin distally. Corolla lobes 5(–10), imbricate in bud, 11–23 × 6–10 mm, overlapping, spreading, membranaceous to chartaceous, elliptic or broadly elliptic, vesture on the outer distal third of the lobes consisting of stellate hairs. Stamen tube none. Distinct portion of filament 6–9 mm long, of equal width throughout or narrowing distally, ventrally not auriculate, densely white-stellate-pubescent on the face, becoming glabrous distally, the hairs with arms to 0.2 mm long. Anthers 4–6 mm long, the connectives not or only slightly prolonged beyond the distally non-tapered anther sacs. Ovary thinly or densely stellate-hirsute. Style glabrous or pubescent at base only. Fruit 10–15(–17) × 9–15(–19)(wider when 2-seeded) mm, globose, indehiscent (rarely dehiscent via 3 valves), hard-walled, wall smooth (but stellate-pubescent). Flowering Dec–May (rarely Jun, Jul); fruiting throughout much of the year, but fruit most commonly maturing Apr–Sep.

Banks of waterways, on steep slopes in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak Forest, Second-growth and Successional Forest, and Shrub Associations; uncommon in Central Plateau, rare in Central Depression, common in Sierra Madre; 550–2500 m. Mex. (Tam., S.L.P., Qro., Hgo., Pue., Ver., Gro., Oax., Chis.), Guat., Hond., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *Ad 513* (US); *EM 4179* (A, DS, F, LL, MICH, MO, NY, US); *EM 4335* (A, DS, LL, MO, NY, US); *EM 5102* (DS, F, LL, MEXU, MO); *EM 15410* [*5410*] (CAS, F, LL, MO, NY); *EM 15922* (F, LL); *EM 15995* [*5995*] (CAS, F, LL, MEXU); *EM 17816* (F); *Mi 7020* (DS, MEXU, US); *Mi 9173* (MEXU); *Mi 9199* (MEXU); *N 3750* (GH, US); *P 1925* (US); *P 9280* (US); *P 10088* (MICH, NY, POM, US); *P 10521* (GH); *P 10545* (GH); *P 10612* (DS, F); *RM 504* (CAS); *T 7814* (LL, MO, RSA); *8917*; *10188*; *24991*; *28186*; *30187*; *34377*; *40415*; *52664*; *58137*; *67582*; *68828*; *69019*.

4. **Styrax magnus** Lundell, Bull. Torrey Bot. Club 66:600. 1939.

—TYPE: Mexico, Chiapas, Volcán Tacaná N, 2 Apr 1939, Matuda 2982 (MICH!; ISOTYPES: A!, B!, F!, GH!, MICH!, MO!, NY!, US!).

Styrax vulcanicola Standl. & Steyerm., Publ. Field Mus. Nat. Hist. Bot. Ser. 22:264. 1940.—TYPE: Guatemala, Dept. San Marcos, between town of Tajumulco and Tecutla (9 mi S and W of Tajumulco), NW slopes of Volcán Tajumulco, 27 Feb 1940, *Steyermark 36801* (F! [2 sheets]).

ILLUSTRATIONS: **Fig. 4**; Fritsch 1997, figs. 58–60.

Evergreen tree to 26 m. Young twigs orange-brown-stellate-pubescent, sometimes mixed with smaller greenish white hairs, outer layer of older twigs not exfoliating. Petiole 17–30 mm long. Lamina chartaceous, 15.5–22.5 × 6.8–12 cm, usually obovate, sometimes broadly elliptic, secondary veins 10–20 on each side of midvein, apex abruptly short-acuminate to rounded, base cuneate to rounded, abaxially covered with minute white stellate hairs and also various amounts of larger white, rarely also orange-brown stellate and somewhat stiff hairs, the latter usually occurring on the veins, the minute hairs absent from the primary through tertiary veins thus the vein surface easily visible, margin entire. Inflorescences paniculate or rarely racemose, the racemes or panicle branches 1.5–4 cm long, 2–10-flowered. Calyx 3.5–5 × 4.5–6 mm, cupuliform or broadly cupuliform, grayish green-stellate-pubescent, occasionally with scattered larger orange-brown stellate hairs toward the base. Calyx teeth 5, to 0.6 mm long, deltoid. Calyx margin truncate or slightly concave between the teeth. Corolla white, (7–)11–12 mm long. Petals connate 0–2 mm beyond the calyx margin distally. Corolla lobes 5, valvate in bud, (7–)8–10 × (2–)3 mm, non-overlapping, spreading, subcoriaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of stellate hairs. Stamen tube 2 mm long. Distinct portion of filament 1–1.2 mm long, of equal width throughout, ventrally not auriculate, white-stellate-pubescent at the incurved filament margins, glabrous or nearly so on the face proximally, increasing in pubescence distally, the hairs with arms to 0.5 mm long. Anthers 5 mm long, the connectives not or only slightly prolonged beyond the distally non-tapered anther sacs. Ovary densely stellate-hirsute. Style glabrous or pubescent at base only. Drupe 15–20 × 9–12 mm, ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering May, Aug; fruiting Sep–Jan.

Exposed ridges, volcanic slopes, sandy soil in Montane Rain Forest, Evergreen Seasonal Forest; uncommon in Northern Highlands, uncommon in Central Plateau, uncommon in E Sierra Madre; 1700–2700 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Alex 1214* (MICH, NY); *Cb 3805* (MO); *L&S s.n.* (CAS); *EM 2982* (A, B, F, GH, MICH, MO, NY, US); *Mi 9170* (US); *Pa 161* (CAS); *T 7963* (CAS, F, MO); *T 9734* (CAS, GH, MICH, MO, NY, TEX, WIS); *31045*; *31106*; *32394*; *39600*; *41446*; *46223*; *49750*; *57053*; *68742*.

5. **Styrax radians** P.W. Fritsch, Ann. Missouri Bot. Gard. 84:745. 1997.

—TYPE: Mexico, Jalisco, [Mpio. de] San Sebastián, Hacienda del Cura, Sierra Madre, 2 Jan 1927, *Mexía 1351* (CAS!; isotypes: A!, DS!, F!, GH!, MICH!, MO!, NY!, UNC, US!).

ILLUSTRATIONS: Fritsch 1997, figs. 61–63.

Evergreen tree 12(–20) m. Young twigs grayish white-stellate-pubescent, often mixed with tawny-or orange-brown stellate hairs; outer layer of older twigs not exfoliating. Petiole 9–17 mm long. Lamina chartaceous, (8.5–)11–15(–24) × 4–9(–11.5) cm, broadly ovate-oblong or elliptic, sometimes lanceolate or suborbicular, secondary veins 9–15 on each side of midvein, apex acute to rounded, rarely broadly cuspidate, base subrounded to rounded, rarely truncate, subcordate, or cuneate, often slightly attenuate, abaxially covered with minute white stellate hairs and also larger, woolly, whitish hairs rendering the surface soft to the touch, the minute hairs absent from the primary through tertiary veins, thus the vein surface easily visible, margin entire. Inflorescences racemose or especially the larger usually paniculate, the racemes or panicle branches 2–6 cm long, 2–14-flowered. Calyx 2.5–5 × 2.5–5 mm, cupuliform or conical-cupuliform, grayish green-stellate-pubescent, rarely also with scattered orange-brown stellate hairs. Calyx teeth 5, to 0.4 mm long or absent, deltoid. Calyx margin truncate or sometimes concave between teeth. Corolla white, 5–15 mm long. Petals connate up to the calyx margin distally. Corolla lobes 5, valvate in bud, 4–14 × 1–3 mm, non-overlapping, moderately or widely spreading, chartaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of stellate hairs. Stamen tube 0–4 mm long. Distinct portion of filament 2.5–3.5 mm long, of equal width throughout, ventrally not auriculate, ± densely white-stellate-pubescent at the incurved filament margins, glabrous or nearly so on the face proximally, increasing in pubescence distally, the hairs with arms to 0.7 mm long. Anthers 2–6 mm long, the connectives not or only slightly prolonged beyond the non-tapered anther sacs. Ovary densely stellate-hirsute. Style pubescent from base to 40–85% of the total length. Drupe 9–13 × 5–7 (wider when 2–seeded) mm (not including occasional beak), ovoid or narrowly ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering Nov–Jun; fruiting Feb–Jul.

Evergreen Seasonal Forest; rare in Central Plateau; 900 m. Mex. (Sin., Nay., Jal., Méx., Ver., Gro., Oax., Chis.). CHIAPAS COLLECTION: *Mz s.n.* (CAS, MEXU).

6. **Styrax ramirezii** Greenm., Proc. Amer. Acad. Arts 34:568. 1899.

—*Styrax argenteus* var. *ramirezii* (Greenm.) Gonsoulin, Sida 5:227. 1974.—TYPE: Mexico, Morelos, Mountain canyons above Cuernavaca, 15 May 1898, *Pringle 6848* (GH!; isotypes: A!, BH!, BR!, F!, MEXU!, MO!, NY!, PH, POM!, US!, W!).

Styrax micranthus Perkins, Bot. Jahrb. Syst. 31:480. 1902. —*Styrax ramirezii* var. *micranthus* (Perkins) Perkins, in Engl., Pflanzenr. IV. 241 (Heft 30):54. 1907.—*Styrax argenteus* var. *micranthus* (Perkins) D'Arcy, Ann. Missouri Bot. Gard. 66:169. 1979.—TYPE: Mexico, México, Temascaltepec, *Ehrenberg 498* (B [destroyed]; isotype: POM!).

Styrax cyathocalyx Perkins, Repert. Spec. Nov. Regni Veg. 2:24. 1906.—TYPE: Mexico, Oaxaca, Rincón, May 1844, *Galeotti 1687* (B [destroyed], as photographs F!, GH!, US!; isotypes: BR[2]!, G-DEL, NY!, US!, W!).

Styrax orizabensis Perkins, Repert. Spec. Nov. Regni Veg. 2:25. 1906. — *Styrax ramirezii* var. *orizabensis* (Perkins) Perkins, in Engl., Pflanzenr. IV. 241 (Heft 30):54. 1907.—TYPE: Mexico, Veracruz (probably) or Puebla, Orizaba, 1856, *Botteri s.n.* or *1006* (B [destroyed]; isotypes, G-DC, NY!, W!).

Styrax hintonii Bullock, Bull. Misc. Inform. Kew 1936:9. 1936 ['*Hintoni*']. *Styrax argenteus* var. *hintonii* (Bullock) Gonsoulin, Sida 5:226. 1974.—TYPE: Mexico, México, Dto. de Temascaltepec, Calera, 19 Apr 1933, *Hinton 3798* (K; isotypes: F!, GH!, MO!, US!).

ILLUSTRATIONS: Fl. Bajio, fasc. 21:9. 1993 [as *S. argenteus* var. *ramirezii*]; Fritsch 1997, figs. 67–70.

Evergreen tree to 20(–27) m. Young twigs short- to long-stellate-pubescent, or radiate-lepidote, the hairs yellow- or orange-brown, or dark brown, sometimes mixed with greenish gray hairs, outer layer of older twigs not exfoliating. Petiole 5–25 mm long. Lamina chartaceous, (10.1–)11–22.5 × 2.9–9.5(–10.5) cm, narrowly or broadly ovate-oblong, elliptic, or sometimes ovate, secondary veins 10–15 on each side of midvein, apex rounded to acuminate, sometimes emarginate through abortive tip development, base cuneate to rounded, abaxially covered with greenish white stellate hairs of various length or sometimes radiate scales, rarely nearly glabrous, veins glabrous to densely tomentose, margin entire. Inflorescences racemose or sometimes paniculate, the racemes or panicle branches 2.5–12 cm long, (2–)5–17-flowered. Calyx (1.5–)3–6 × (3–)3.5–6.5 mm, cupuliform, grayish green- or brown-radiate-lepidote (ours), or short- to long-stellate-pubescent, scales at mid-calyx 0.05–0.17 mm diam. (0.15–0.17 mm diam. in ours). Calyx teeth 5, to 0.5 mm long, deltoid. Calyx margin slightly or distinctly concave between the teeth. Corolla white or pink, (8–)11–14 mm long. Petals connate 1–3 mm beyond the calyx margin distally. Corolla lobes 5, valvate in bud, 6–10 × 2–3 mm, non-overlapping, slightly spreading, subcoriaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of stellate hairs. Stamen tube 1–3 mm long. Distinct portion of filament 0.6–2 (–2.6) mm long, of equal width throughout, ventrally not auriculate, white-stellate-pubescent at the somewhat incurved filament margins, glabrous or nearly so on the face proximally, increasing in pubescence distally, the hairs with arms to 0.3 mm long. Anthers 3–4.8 mm long, 1.9–5.3 times as long as the distinct portion of the filaments, the connectives not or only slightly prolonged beyond the distally non-tapered anther sacs. Ovary densely stellate-hirsute. Style glabrous or pubescent at base only. Drupe (7–)9–15 × 5–9 mm, ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering and fruiting at various times throughout the year.

Banks of waterways, sides of arroyos, humid canyons, deep riverbeds in Evergreen Cloud Forest, Evergreen Seasonal Forest, Pine-Oak Forest; rare in Central Plateau; 1300–3100 m. Mex. (Sin., Dgo., Nay., Jal., Cma., Mich., Méx., Mlos., Gro., Oax., Chis.). CHIAPAS COLLECTIONS: *La 408* (DS, LL, US); *T 9329* (CAS, TEX, WIS).

7. **Styrax warscewiczii** Perkins, Bot. Jahrb. Syst. 31:480. 1902.

—TYPE: Costa Rica or Panama, "Veragua", [?1848], *Warscewicz 203* (B [destroyed], as photographs GH!, MICH!, US!; isotype: F!).

Styrax polyneurus Perkins, Bot. Gaz. 35:5. 1903.—TYPE: Costa Rica, San José, "In silvis ad Copey," Feb 1898 [?1896], *Tonduz 11744* (B [destroyed]; isotypes: CR!, F!, US!).

ILLUSTRATIONS: Fieldiana: Botany 24, pt. 8(3):259, fig. 71. 1967 [as *S. argenteus*]; Ann. Missouri Bot. Gard. 66:168, fig. 1 [as *S. argenteus*]. 1979; Fritsch 1997, figs. 71–73.

Evergreen tree to 20(–30) m. Young twigs stellate-pubescent, the hairs usually orange-brown, sometimes yellowish brown or dark brown, rarely greenish gray mixed with brown hairs, outer layer of older twigs not exfoliating. Petiole 5–20(–25) mm long. Lamina chartaceous, 5.2–12.5(–16) × 1.6–4.5(–5.4) cm, narrowly or broadly elliptic, secondary veins 9–12 on each side of midvein, apex sometimes subrounded or acute, more often cuspidate to acuminate, base cuneate or less often subrounded, abaxially thickly covered with greenish white and often larger orange-brown stellate hairs, the secondary and tertiary veins glabrous to densely tomentose, margin entire. Inflorescences racemose or paniculate, the racemes or panicle branches 2–6 cm long, 2–21-flowered. Calyx 2.5–4 × 3–5 mm, broadly conical or cupuliform, grayish green-radiate-lepidote, often with larger, scattered orange-brown scales especially toward the base, scales at mid-calyx 0.13–0.33 mm diam. Calyx teeth 5, to 0.5 mm long, deltoid. Calyx margin concave between the teeth. Corolla usually pink, sometimes white or white with pink lobes, 9–17 mm long. Petals connate (0–)2–6 mm beyond the calyx margin distally. Corolla lobes 5, valvate in bud, 6–13 × (1–)1.5–2.5(–2.9) mm, non-overlapping, spreading or nearly erect, subcoriaceous, linear-deltoid, vesture on the outer distal third of the lobes consisting of radiate scales. Stamen tube 1–3 mm long. Distinct portion of filament (1–)1.3–2.5 mm long, of equal width throughout, ventrally not auriculate, white-stellate-pubescent at the somewhat incurved filament margins, glabrous or nearly so on the face proximally, increasing in pubescence distally, the hairs with radiate arms to 0.3 mm long. Anthers 1.7–3.6 mm long, 1.1–2.2 times as long as the distinct portion of the filaments, the connectives not or only slightly prolonged beyond the distally non-tapered anther sacs. Style glabrous or pubescent at base only. Ovary densely stellate-hirsute. Drupe 7–12(–15) × 4–7(–8) mm, ellipsoid, wall irregularly and coarsely rugose on herbarium specimens. Flowering and fruiting apparently at various times throughout the year.

Along waterways, in valleys, roadsides in Lower Montane Rain Forest, Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, Pine-Oak Forest, Second-growth and Successional Forest, and Shrub Associations; uncommon in Northern Highlands, uncommon in Central Plateau, common in Sierra Madre; 1100–2700 m. Mex. (Oax., Chis.), Guat., Hond., Salv., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Bo 8335* (F); *De 849* (CAS, MEXU, NY); *Glie CH–54* (CAS, TEX); *GE 1148* (MEXU); *GE 1279* (MEXU); *GE 1659* (MEXU); *Li s.n.*, 1840 (F); *Li 358* (BR); *EM 467* (MICH, US); *EM 568* (MEXU, MICH, US); *EM 2668* (A, F, MICH, NY, US); *EM 3930* (A, LL, MEXU, MICH, MO, NY); *EM 4135* (A, DS, LL, MEXU, MICH, NY, US); *EM 16265* (MICH, MO, US); *Mil 2752* (MO); *Mi 7055* (MEXU); *Mi 7232* (MEXU, US); *P 82* (US); *P 157* (US); *P 10082* (NY); *P 10555* (MO, NY, US); *Rey 1902* (MEXU, MO); *21827*; *22841*; *25292*; *25732*; *27646*; *30989*; *31368*; *40224*; *41339*; *41611*; *50020*; *52994*; *55749*; *69083*.

SYMPLOCACEAE

Lawrence M. Kelly

The New York Botanical Garden
Bronx, NY 10458

Frank Almeda

Department of Botany
California Academy of Sciences
875 Howard Street
San Francisco, CA 94103

Evergreen (in Chiapas) trees or shrubs. Leaves simple, alternate, spirally or distichously arranged, exstipulate, penninerved, membranous to coriaceous, typically glabrous adaxially, glabrous or pubescent abaxially. Inflorescences axillary, often consisting of short, bracteolate racemes, spikes, panicles, or fascicles, or flowers solitary. Flowers actinomorphic, perfect (in Chiapas) or unisexual (the plants then dioecious or polygamous), often sweetly fragrant. Hypanthium glabrous or pubescent. Calyx lobes 5, imbricate, abaxially glabrous or pubescent, adaxially glabrous. Corolla sympetalous, divided approximately halfway, but with margins of lobes distinct nearly to base (thus with medial portions of lobes connate distally beyond the margins, which are seen as free longitudinal flaps toward the base); petals 5(–7) (in Chiapas), imbricate, abaxially glabrous or pubescent, adaxially glabrous. Stamens numerous, multiseriate; filaments adnate to the corolla, distally distinct beyond point of adnation (*S. longipes* and extra-Chiapas species) or proximally connate for part of their length to form a monadelphous tube, the distinct portions ligulate, papillose, and contracted apically to form a filiform stipe (terete, without papillae, and estipitate in *S. longipes*); anthers basifixed, compressed ovoid-globose, bilocular, dehiscent by longitudinal slits. Ovary inferior, 3–5-locular (in Chiapas), crowned by an inconspicuous, intrastaminal, nectariferous disk that is glabrous or pubescent, placentation axile, ovules 2–4 in each locule; style simple and straight; stigma capitate, shallowly or deeply lobed. Fruit a stony drupe crowned by the persistent calyx lobes, with a fleshy, corky, or leathery mesocarp, endocarp woody, in cross-section rounded, undulate, or irregularly fluted; seed 1 per locule, ellipsoid or sometimes curved, endosperm copious.

The family consists of a single genus, *Symplocos*, which is distributed predominantly in tropical and subtropical America, southern and eastern Asia, Australia, and the East Indies. A few species are also found at temperate latitudes in the northern hemisphere. Many species with leaves that turn yellowish on drying accumulate aluminum. This may serve a protective function by repelling herbivores. *Symplocos* can be difficult to distinguish from *Symplococarpon* (Theaceae), which also has inferior ovaries and indehiscent fruits with a persistent calyx. Nevertheless, in *Symplococarpon* the fruits are 2-locular, long-pedicellate, and fasciculate or solitary by abortion; the 2(–3) styles are distinct to the base; the stigma is punctiform; and the anthers are oblong-elliptic and taper into a subulate mucro.

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SYMPLOCOS

Symplocos Jacq., Enum. Syst. Pl. 5:24. 1760.—Type: *Symplocos martinicensis* Jacq.

Characters of the family.

A genus of 250–300 species, with its greatest diversity in the East Indies and South America. Approximately 15 species occur in Mexico, with nine in Chiapas. All but one of the Chiapan species of *Symplocos* are members of *Symplocos* subg. *Symplocos*, which is characterized by stamens that are basally connate to form a tube that is adnate to the corolla. *Symplocos longipes* is a member of *Symplocos* subg. *Hopea* and has stamens that are distinct to the base, where they are individually adnate to the corolla.

In the following species descriptions calyx lobe width measurements were taken at the base of the lobes. The nectary disk at the apex of the fruit is often concealed by the persistent calyx lobes; nevertheless the shape of the disk is distinctive for some species (e.g., *S. limoncillo*).

Key to the species of *Symplocos* in Chiapas

a. Calyx lobes abaxially glabrous (but margins sometimes ciliate), or at most pubescent in a small tuft or with a few hairs; hypanthium glabrous; fruits glabrous; corolla lobes abaxially glabrous.
b. Leaf margins crenate, crenulate, or serrulate; mature fruits 0.6–1.8 cm long.
c. Mature fruits (1.2–)1.5–2 cm long; veins of abaxial leaf surface prominent; leaf blades yellow-green and nitid on both surfaces when dry . . . . 6. *S. limoncillo*
cc. Mature fruits 0.6–1 cm long; veins of abaxial leaf surface not prominent; leaf blades bicolored when dry, almost black adaxially and dark green abaxially . . . . 1. *S. bicolor*
bb. Leaf margins entire (occasionally serrate at apex in *S. longipes*); mature fruits 1.5–3.5 cm long.
d. Flowers in open racemes or panicles 2–5(–8) cm long, pedicels 1–3 cm long; leaves 3.5–5 cm wide; filaments distinct to base, terete, not papillose, not stipitate apically; style glabrous . . 7. *S. longipes*
dd. Flowers sessile in condensed racemes, pedicels lacking; leaves 4–9 cm wide; filaments connate to form a tube, the distinct portions ligulate, papillose, and stipitate apically; style densely pilose basally . . . . 5. *S. johnsonii*
aa. Calyx lobes pubescent on abaxial surface (sparsely so in *S. breedlovei*); hypanthium pubescent; fruits glabrous or pubescent; corolla lobes abaxially glabrous or pubescent.
e. Corolla lobes densely pubescent on abaxial surface.
f. Flowers solitary, or rarely in pairs or threes . . . . 4. *S. hartwegii*
ff. Flowers in racemes, spikes, or cymes.
g. Calyx lobes 0.5–1 mm long; mature fruits 0.6–0.9 cm long . . . . 8. *S. matudae*
gg. Calyx lobes 2–5 mm long; mature fruits 1.5–2.7 cm long . . . . 3. *S. excelsa*
ee. Corolla lobes glabrous or very sparsely pubescent on abaxial surface.
h. Mature fruits 1.5–3.5 cm long; leaf blades 8–21 cm long.

i. Juvenile buds, vegetative branches, abaxial leaf surfaces, and inflorescences densely ferruginous-hirsute; leaf base rounded to cordate; calyx lobes lanceolate, densely ferruginous-hirsute . . . . .9. *S. tacanensis*

ii. Juvenile buds, vegetative branches, abaxial leaf surfaces, and inflorescences glabrous to puberulent; leaf base acute; calyx lobes suborbicular, sparsely sericeous or glabrous . .5. *S. johnsonii*

hh. Mature fruits 0.6–1 cm long; leaf blades 4.1–8(–10) cm long.

j. Dry leaves nearly black adaxially or at least darker on adaxial surface than on abaxial surface; leaf margins crenulate to serrulate, not denticulate . . . . .8. *S. matudae*

jj. Dry leaves yellow-green and nitid on both surfaces; leaf margins serrulate-denticulate with minute, black, deciduous teeth . . . . .2. *S. breedlovei*

1. **Symplocos bicolor** L.O. Williams, Fieldiana, Bot. 31:265. 1967.

—TYPE: Belize, Mullins River road, 15 Dec 1931, 100 ft, *W. Schipp 862* (F!; isotypes: CAS!, NY!).

ILLUSTRATIONS: Fieldiana, Bot. 31:265, fig. 2. 1967; Fieldiana, Bot. 24(8):253, fig. 70. 1967.

Trees 4–15 m tall; juvenile branches, vegetative buds, and inflorescences moderately strigose, hairs 0.5–1 mm long, whitish. Leaf blades 5–13.5 cm long, 2–5 cm wide, elliptic to elliptic-obovate, membranous to subcoriaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially glabrous to inconspicuously strigillose on the impressed midvein, abaxially sparsely strigillose to glabrous, base acute, margins crenulate or serrulate, apex acuminate; petioles 0.4–1 cm long. Inflorescences short axillary cymes or racemes (rachis 0.5–2 cm long) with 3–6 flowers, pedicels 0–1 mm long; bracts and bracteoles 1–3 mm long, 0.5–2 mm wide, persistent, elliptic to elliptic-ovate, rarely to obovate, densely strigillose abaxially. Hypanthium glabrous. Calyx lobes 0.5–1 mm long, 1 mm wide at base, broadly ovate to suborbicular, abaxially glabrous or glabrate, margins ciliate. Corolla 5–7 mm long, white, lobes oblong-obovate, abaxially glabrous, connate basally for 2–3 mm and adnate to the filament tube for 3 mm at base. Stamens 3-seriate; filaments connate basally for 3–4 mm, distinct portions 1.5–3 mm long, 0.5–0.75 mm wide. Disk persistently sericeous to strigillose. Style 4–7 mm long, glabrous; stigma irregularly lobed. Fruits 0.6–1 cm long, 0.4–0.7 cm diam., ovoid to ellipsoid, glabrous, 3–5-locular in cross-section, disk ± convex, perimeter of woody endocarp rounded.

Evergreen Seasonal Forest; rare in Central Plateau; 130 m. Mex. (Chis.), Guat., Bel., Nic. CHIAPAS COLLECTION: *Mz 15891* (MEXU, MO).

This species is part of a complex that includes *Symplocos martinicensis* Jacq. (of the Antilles) and *S. costaricana* Hemsl. In Central America, *S. bicolor* is distinguishable from *S. costaricana* by its crenulate or serrulate leaves (versus entire in *S. costaricana*); whether these two species are adequately distinguished from *S. martinicensis* needs to be more carefully studied.

2. **Symplocos breedlovei** Lundell, Wrightia 4:122. 1969.

—TYPE: Mexico, Chiapas, Tenejapa, Pokolum, paraje of Sibanilha, 11 Aug 1965, 5200 ft, *D. Breedlove 11747* (LL; isotype: CAS!).

ILLUSTRATION: none found.

Trees or shrubs 0.5–10 m tall; juvenile branches, vegetative buds, and inflorescence rachis moderately to sparsely sericeous, hairs 0.2–0.3 mm long, whitish. Leaf blades 4.5–8(–10) cm long, 1.7–3(–4) cm wide, elliptic to lanceolate, subcoriaceous to coriaceous, concolored and typically yellow-green and nitid on both surfaces when dry, adaxially glabrous, abaxially with midvein moderately strigose, other surfaces sparsely strigose, base acute, margins serrulate-denticulate, apex acuminate; petioles 0.5–0.6 cm long. Inflorescences short axillary racemes (rachis 3–10 mm long) with 5–10 subsessile to short-pedicellate flowers, pedicels to 1 mm long; bracts and bracteoles 1.5–2 mm long, 1–1.2 mm wide, deciduous, triangular-ovate, sericeous abaxially. Hypanthium densely sericeous. Calyx lobes 1–1.5 mm long, 1–1.5 mm wide at base, triangular, abaxially sparsely sericeous (more densely along dorsal midline), margins ciliate. Corolla 9–11 mm long, pink, lobes ± oblong, abaxially glabrous, connate basally for ca. 3 mm and adnate to the filament tube for 5–6 mm at base. Stamens 3-seriate; filaments connate basally for 8–9 mm, distinct portions 1–2 mm long, 0.25–0.5 mm wide. Disk moderately to densely sericeous. Style 7–10 mm long, pilose basally; stigma conspicuously 6-lobed. Fruits 0.8–1 cm long, 0.3–0.4 cm diam., ellipsoid, sparsely strigillose, 3-locular in cross-section, disk ± flat, perimeter of woody endocarp rounded.

Steep slopes in uncut Evergreen Cloud Forest, Pine-Oak-*Liquidambar* Forest, and Pine-Oak Forest; common in Central Plateau; 2000–3050 m. Mex. (Chis.), Guat. CHIAPAS COLLECTIONS: *Cb 3809* (MEXU, NY); *Cb 5760* (MEXU); *Cb 5997* (MEXU); *MC 2410* (F, MEXU); *GE 1319* (MEXU); *Ke 1334* (CAS, MEXU); *La 2730* (DS, MEXU, NY, US); *MI 170* (CAS, MEXU); *MI 177* (CAS, MEXU); *M&L 933* (CAS); *Mi 9204* (MEXU, US); *Och 4560* (CAS); *Pan 3103* (MEXU); *SR 236* (CAS); *SR 236* (MEXU); *SR 495* (CAS, MEXU); *SR 673* (CAS, NY); *Sta 195* (F, MEXU, NY); *Te 7266* (CAS, MEXU); *Ten 15551b* (CAS, MEXU); *T&L 40131* (DS); *T 1307* (DS, MEXU, NY); *T 2362* (DS); *T 393* (F); *T 449* (CAS, MEXU, NY); *T 478* (CAS, F, LL, US); *T 793* (CAS, GH, LL, NY); *T 875* (CAS, MEXU, NY); *T 8105* (CAS, MEXU); *T 9652* (CAS, F); *T 9527* (CAS, MEXU, NY); *T 9564* (CAS, GH, MEXU, MO, NY); *T 9565* (CAS, MEXU, NY); *T 9660* (CAS, GH, MEXU); *We 11716* (MEXU); *7815*; *8010*; *10437*; *12464*; *12563*; *12938*; *22030*; *28202*; *30432*; *41406*; *50049*; *53382*; *53578*; *55514*; *55582*; *57060*; *67051*; *67195*; *68360*; *69865*; *71401*.

3. **Symplocos excelsa** L.O. Williams, Fieldiana, Bot. 32:204. 1970.

—TYPE: Mexico, Chiapas, slopes at Lago de Monte Bello, 25 mi E of La Trinitaria, 17 Aug 1966, 5200 ft, D. *Breedlove 15013* (F!; isotypes: DS!, NY!, US!).

ILUSTRATION: none found.

Trees 12–24 m tall; juvenile branches, vegetative buds, and inflorescences densely sericeous, hairs 0.2–0.5 mm long, brownish. Leaf blades 9–17 cm long, 4–5.5 cm wide, elliptic to oblanceolate-elliptic, coriaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially glabrous, abaxially sparsely strigose to densely hispid, base acute or cuneate, margins serrulate or rarely subentire, apex acuminate; petioles 0.5–0.7 cm long. Inflorescences condensed axillary racemes (rachis to 3 mm long) with 5–10 sessile flowers; bracts and bracteoles 5–10 x 5–8 mm, deciduous, broadly ovate, densely sericeous abaxially. Hypanthium densely sericeous. Calyx lobes 4–5 mm long, 3–4 mm wide at base, oblong, abaxially densely sericeous, margins densely sericeous. Corolla 12–15 mm long, pink, lobes linear-oblong, abaxially densely sericeous except along margins, connate basally for 7–8 mm and adnate to the filament tube for 7–8 mm at base. Stamens ± 4-seriate; filaments connate basally for 10–11 mm, distinct portions 3–5 mm long, 0.5–0.75 mm wide. Disk persistently pilose. Style 13–15 mm long, pilose basally; stigma conspicuously but irregularly lobed. Fruits 1.5–2.7 cm long, 0.8–1.5 cm diam., cylindrical to narrowly obconic, hispidulous, 4–5-locular in cross-section, disk convex, perimeter of the woody endocarp rounded to slightly undulate.

Montane Rain Forest and Pine-Oak-*Liquidambar* Forest; uncommon in Northern Highlands and Central Plateau; 1170–1700 m. Mex. (Ver., Chis.). CHIAPAS COLLECTIONS: *32189*; *48738*; *56131*; *56149*.

4. **Symplocos hartwegii** A. DC., Prodr. 8:252. 1844.

—SYNTYPES: Mexico, without locality, "J. Pavón s.n." (G-Bois.?); [Guatemala], Santa María [de Jesús], *K. Hartweg 545* (B, as photograph NY!). The specimen attributed to Pavón was likely collected by Sessé and Mociño.

Symplocos cernua Bonpl. var. *mexicana* A. DC., Prodr. 8:248. 1844.—TYPE: [Guatemala], Santa María [de Jesús], *K. Hartweg 545* (B, as photograph NY!).

ILLUSTRATIONS: **Fig. 5**; frontispiece.

Trees 6–30 m tall; vegetative buds and distal branches sericeous, hairs 0.4–0.8 mm long, brownish. Leaf blades 3.5–5.5(–7) cm long, 2–3(–3.5) cm wide, elliptic or elliptic-oblong to obovate, chartaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially glabrous, abaxially moderately to sparsely appressed-pilose (more densely along protruding midvein), base acute to obtuse, margins subentire to minutely serrulate, apex obtuse and short-acuminate; petioles 0.5–0.9 cm long. Flowers axillary, solitary (rarely in groups of 2 or 3), subsessile or with peduncle to 4 mm long; bracts and bracteoles 3–4 mm long, 3–4 mm wide, early deciduous, ovate, abaxially puberulent to sericeous, margins ciliate. Hypanthium densely sericeous. Calyx lobes 2–4 mm long, 2–3 mm wide at base, broadly ovate, abaxially densely sericeous or glabrous near margins, margins ciliate and often glandular. Corolla 7–12 mm long, pink, lobes oblanceolate, abaxially densely sericeous but glabrous near margins, connate basally for 3–5 mm and adnate to the filament tube for 4–5 mm at base. Stamens 4-seriate; filaments connate basally for 5–7 mm, distinct portions 3–4 mm long, 0.75–1 mm wide. Disk densely pilose, becoming glabrate in fruit. Style 7–9 mm long, sparsely pilose basally; stigma ± 3-lobed. Fruits 2–3 cm long, 1–2 cm diam., cylindric, ovoid, or ellipsoid, subglabrous to

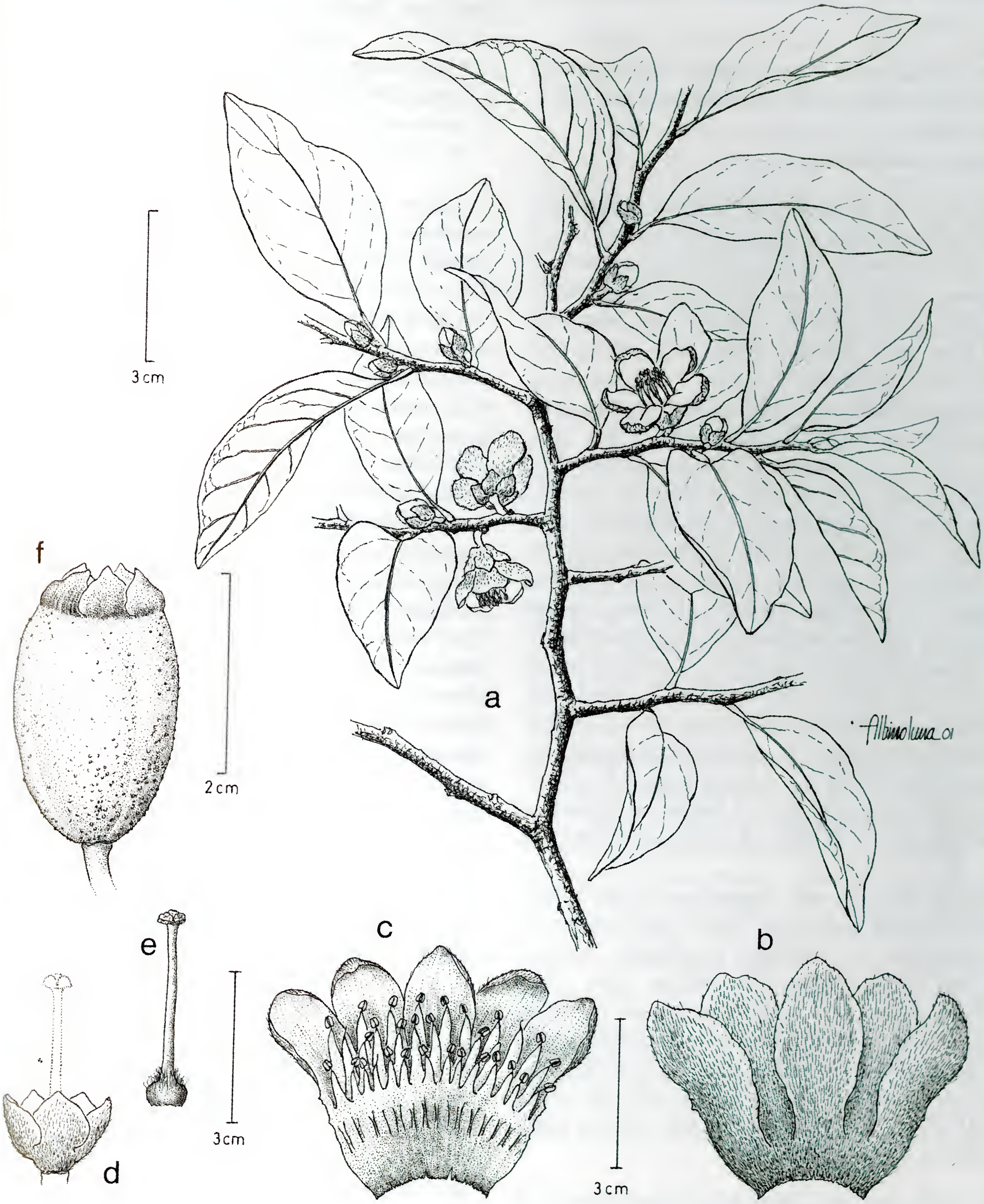

FIGURE 5. *Symplocos hartwegii* A. DC. a, Flowering shoot; b, Corolla (abaxial surface); c, Corolla (adaxial surface) and androecium; d, Calyx and style; e, Gynoecium; f, Mature fruit. (a–e from *Breedlove 31851*; f from *Breedlove 58168*).

strigillose, 3-locular in cross-section, disk convex, perimeter of the woody endocarp rounded.

Steep slopes in undisturbed Montane Rain Forest, Evergreen Cloud Forest, and Pine-Oak Forest; common in Sierra Madre; 1900–3000 m. Mex. (Chis.), Guat., Hond. CHIAPAS COLLECTIONS: *He 494* (MEXU); *EM 4674* (MEXU, MO, NY); *EM 5047* (DS, F); *Ke 1339* (CAS, MEXU); *22743*; *29419*; *30120*; *31194*; *31851*; *40367*; *55790*; *55873*; *58168*; *66150*; *66151*.

5. **Symplocos johnsonii** Standl., J. Wash. Acad. Sci. 17:169. 1927.

—TYPE: Guatemala, Alta Verapaz, Samac, near Coban, 20 Oct 1920, 1350 m, *H. Johnson 874* (US!; isotype: US!)

ILLUSTRATION: none found.

Trees 9–21 m tall; juvenile branches, vegetative buds, and inflorescences glabrous. Leaf blades 10–21 cm long, 4–9 cm wide, elliptic or oblong to obovate, subcoriaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially and abaxially glabrous, base acute, margins entire, apex obtuse and sometimes short acuminate; petioles 1–2.5 cm long. Inflorescences condensed, sessile, axillary racemes with 5–8 sessile flowers; bracts and bracteoles 2–3 mm long, 2–3 mm wide, persistent, orbicular, glabrous to sericeous abaxially. Hypanthium glabrous to puberulent. Calyx lobes 1–2 mm long, 2–2.5 mm wide at base, suborbicular, abaxially sericeous to glabrous, margins ciliate. Corolla 9–15 mm long, white or pink, lobes linear-oblong to oblanceolate, abaxially glabrous, connate basally for 5–6 mm and adnate to the filament tube for 6–7 mm at base. Stamens 3–4-seriate; filaments connate basally for 9–12 mm, distinct portions 3–5 mm long, 0.5–0.75 mm wide. Disk densely pilose. Style 9–15 mm long, densely pilose basally; stigma conspicuously but irregularly lobed. Fruits 1.7–3.5 cm long, 0.8–1.5 cm diam., ± cylindrical, glabrous, 3-locular in cross-section, disk obconic, perimeter of woody endocarp not seen.

Montane Rain Forest, Evergreen Cloud Forest, Evergreen Seasonal Forest, and Pine-Oak-*Liquidambar* Forest; common in Northern Highlands, Central Plateau, and Sierra Madre; 850–2043 m. Mex. (Ver., Oax, Chis.), Guat. CHIAPAS COLLECTIONS: *He 2082* (MEXU); *Mi 2841* (DS, MEXU); *Mi 6528* (MEXU); *Mi 9172* (DS, MEXU); *Pa 362* (CAS); *T&L 40307* (DS, LL); *T&L 41772* (DS); *T&L 46772* (MEXU); *We 17788* (CAS, MEXU); *Z 287* (DS); *Z 334* (DS); *Z 718* (DS); *27608*; *38000*; *60227*; *67089*.

6. **Symplocos limoncillo** Bonpl., Pl. Aequinoct. 1:196. 1808.

—*Styrax limoncillo* (Bonpl.) Miers, J. Linn. Soc., Bot. 17:292. 1880.—TYPE: Mexico, Veracruz, without locality, *A. von Humboldt & A. Bonpland s.n.* (?P-Bonpl.; specimen not seen, not on microfiche).

Symplocos chiriquensis Pittier, Contr. U.S. Natl. Herb. 18:168. 1916.—TYPE: Panama, Chiriquí, along the Caldera River near El Boquete, 4 Mar 1911, *H. Pittier 2994* (US!; isotypes: GH!, NY!).

Symplocos flavifolia Lundell, Amer. Midl. Naturalist 20:240. 1938.—TYPE: Mexico, Chiapas, Montecristo, Jan 1938, *E. Matuda 1980* (MICH; isotypes: DS!, F!, NY!, US!).

ILLUSTRATIONS: Contr. U.S. Natl. Herb. 18:168, figs. 94, 95. 1916.

Trees 7–20 m tall; vegetative buds, juvenile branches, and inflorescence rachis moderately to sparsely sericeous, hairs 0.2–0.3 mm long, whitish. Leaf blades 6.6–15 cm long, 2–7 cm wide, elliptic to oblanceolate, subcoriaceous, concolored and typically yellow-green and nitid on both surfaces when dry, adaxially glabrous, abaxially glabrous or very sparsely beset with appressed white hairs on the elevated midvein, base acute, margins crenate to serrulate, apex acute to acuminate; petioles 0.7–2 cm long. Inflorescences short axillary racemes (rachis 1.5–4 cm long) with 2–6 sessile or subsessile flowers; bracts and bracteoles 1.5–2 mm long, 0.5–1.5 mm wide, early deciduous, elliptic to elliptic-ovate, moderately to sparsely sericeous abaxially. Hypanthium glabrous. Calyx lobes 1–2 mm long, 1.5–2 mm wide at the base, rotund, abaxially glabrous, margins ciliate. Corolla 8–11 mm long, white or pink, lobes ovate, abaxially glabrous, connate basally for 3–4 mm and adnate to the filament tube for 4–5 mm at base. Stamens 3-seriate; filaments connate basally for 5–6 mm, distinct portions 0.5–2.5 mm long, 0.25–0.5 mm wide. Disk moderately to densely sericeous. Style 7–9 mm long, glabrous; stigma conspicuously but irregularly lobed. Fruits (1.2–)1.5–2.0 cm long, (0.8–)1–1.4 cm diam., ellipsoid to oblong, glabrous, 3–5-locular in cross-section, disk flat or pulvinate, perimeter of woody endocarp rounded.

On slopes or near water in Montane Rain Forest, Pine-Oak-*Liquidambar* Forest, and Pine-Oak Forest; common in Northern Highlands, Central Plateau, and Sierra Madre; 700-2000 m. Mex. (Ver., Oax., Chis.), Guat., Salv., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Hamp 1208* (F, MEXU); *He 1143* (MEXU); *La 1543* (DS, F, MEXU); *EM 4252* (DS, F, GH, MEXU, MO, NY, US); *EM 4334* (A, DS, MEXU, NY, US); *EM 5053* (F, MEXU, NY); *EM 15363* (F, MEXU); *EM 16415* (F, MEXU); *EM 17839* (DS, MEXU); *EM 18097* (CAS, DS, MEXU); *EM 18328* (DS, MEXU); *Mi 6985* (MEXU, US); *T&L 41709* (DS); *T 3559* (DS, F, MEXU); *Ve 3766* (MEXU); *11979*; *22865*; *22905*; *24065*; *48692*; *49819*; *50762*; *53149*; *53238*; *56952*; *56992*; *67515*.

7. **Symplocos longipes** Lundell, Wrightia 4:123. 1986.

—TYPE: Mexico, Chiapas, Tenejapa, paraje of Shohleh, 2 Oct 1965, 7800 ft, *D. Breedlove 12716* (LL; isotypes: DS!, F!).

ILLUSTRATION: none found.

Trees 3–20 m tall; vegetative buds, juvenile branches, and inflorescences glabrous. Leaf blades 7–12(–14) cm long, 3.5–5 cm wide, elliptic to oblong, coriaceous, concolored and typically yellow-green and nitid on both surfaces when dry, adaxially glabrous, abaxially glabrous or very sparsely beset with appressed white hairs on the elevated midvein, base acute to obtuse, margins entire or with a few sharp teeth distally, apex acuminate; petioles 0.6–0.9 cm long. Inflorescences long, open axillary racemes or panicles (rachis 2–8 cm long) with 4–10 long-pedicellate flowers, pedicels 1–3 cm long; bracts and bracteoles 1–2 mm long, 1–2 mm wide, early deciduous, ovate, glabrous. Hypanthium glabrous. Calyx lobes 2–3 mm long, 3–5 mm wide at the base, suborbicular, abaxially glabrous, margins ciliate. Corolla 7–10 mm long, white, lobes broadly oblong, abaxially glabrous to minutely sericeous, connate basally for ca. 1 mm and adnate to the filaments for ca. 1 mm at base. Stamens ± 3-seriate; filaments distinct to base, 8–10 mm long, 0.2–0.3 mm wide. Disk glabrous. Style 8–10 mm long, glabrous; stigma conspicuously but irregularly lobed. Fruits 1.5–2.0 cm long, 5–8 mm diam., cylindrical to ellipsoid, glabrous, 3-locular in cross-section, disk flat to slightly convex, perimeter of woody endocarp rounded.

Evergreen Cloud Forest and Pine-Oak-*Liquidambar* Forest; uncommon in Central Plateau; 2043–2774 m. Mex. (Ver., Gro., Oax., Chis.), Guat. CHIAPAS COLLECTIONS: *Pa 436* (CAS); *T 215* (DS); *T 585* (DS); *T 2364* (DS); *50675*; *53390*; *58075*; *68604*.

8. **Symplocos matudae** Lundell, Amer. Midl. Naturalist 20:241. 1938.

—TYPE: Mexico, Chiapas, Mt. Pasitar, 29 Dec 1936, *E. Matuda 472* (MICH; isotypes: F!, LL!, US!).

Symplocos chiapensis Lundell, Amer. Midl. Naturalist 20:240. 1938.—Type: Mexico, Mt. Ovando, near Escuintla, Apr 1936, *E. Matuda 2208* (MICH; isotypes: CAS!, MEXU!).

Symplocos vernicosa L.O. Williams, Fieldiana, Bot. 31(10):267. 1967.—TYPE: Honduras, Francisco Morazán, near summit San Juancito Mountains, 22 May 1957, 2000 m, *L. Williams 17341* (F!; isotype: US!).

ILLUSTRATION: none found.

Trees 4–9 m tall; juvenile branches and vegetative buds sericeous, hairs mostly less than 0.5 mm long, white. Leaf blades 4.1–9 cm long, 2–3.5 cm wide, elliptic to elliptic-ovate, coriaceous to subcoriaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially glabrous, abaxially sparsely and inconspicuously sericeous to glabrate, base acute, margins serrulate or crenulate to subentire, apex abruptly short-acuminate; petioles 0.5–1 cm long. Inflorescences short axillary racemes or spikes (rachis 5–10 mm long) with 2–7 sessile or subsessile flowers; bracts and bracteoles 0.5–2 mm long, 1–2 mm wide, persistent, ovate to suborbicular, moderately sericeous abaxially. Hypanthium densely sericeous. Calyx lobes 0.5–1 mm long, 1–2 mm wide at base, broadly ovate, abaxially sericeous, glabrate in fruit, margins sericeous, glabrate in fruit. Corolla 6–9 mm long, pink, lobes oblong-obovate, abaxially glabrous to moderately sericeous, connate basally for 3 mm and adnate to the filament tube for 3–5 mm at base. Stamens 3-seriate; filaments connate basally for 4–6 mm, distinct portions 0.5–2.5 mm long, 0.25–0.5 mm wide. Disk densely pilose. Style 5–9 mm long, pilose basally; stigma 5-lobed. Fruits 0.6–0.9 cm long, 0.4–0.6 cm diam., ellipsoid to oblong, strigillose to glabrate, 3-locular in cross-section, disk flat to convex, perimeter of woody endocarp rounded.

Steep slopes in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-*Liquidambar* Forest, and Pine-Oak Forest; common in Northern Highlands, Central Plateau, and Sierra Madre; (500–)1370–2700 m. Mex. (Chis.), Guat., Hond., Salv., Nic. CHIAPAS COLLECTIONS: *Cz 2917* (NY); *MC 2257* (MEXU); *Cro 46592* (MEXU); *HM 510* (MEXU, NY); *EM 15483* (F, MEXU); *Ke 1349* (CAS, MEXU); *Mi 6094* (CAS, DS, MEXU, US); *Mi 6532* (MEXU); *Ne 5598* (CAS); *Rz 660* (MEXU); *S&B 2824* (F, MEXU, MO); *T 2644* (DS, LL); *8889*; *9674*; *23095*; *25334*; *25772*; *29642*; *31100*; *32715*; *33529*; *40225*; *41317*; *41347*; *41705*; *47845*; *49341*; *49687*; *51306*; *52249*; *53008*; *57471*; *68583*.

9. **Symplocos tacanensis** Lundell, Bull. Torrey Bot. Club 66:601. 1939.

—TYPE: Mexico, Chiapas, N slope of Volcán Tacaná, 2 Apr 1939, 2100 m, *E. Matuda 2976* (MICH; isotypes: CAS!, MEXU!, NY!, US!).

ILLUSTRATION: none found.

Trees 9–19 m tall; juvenile branches, vegetative buds, and inflorescences densely ferruginous-hirsute, hairs mostly 1.5–2.5 mm long. Leaf blades 8–14 cm long, 4–5.8 cm wide, oblong to lanceolate or lance-oblong, subcoriaceous, bicolored when dry, almost black adaxially and dark green abaxially, adaxially strigose when young and along major veins, abaxially ferruginous-hirsute, base rounded to cordate, margins entire, apex acuminate; petioles 0.3–0.7 cm long. Inflorescences condensed axillary racemes (rachis 3–4 mm long) with 5–12 sessile flowers; bracts and bracteoles 3–4 mm long, 1.5–2 mm wide, deciduous, lance-ovate, densely ferruginous-hirsute. Hypanthium densely ferruginous-hirsute. Calyx lobes 3–4 mm long, 2–3 mm wide at base, lanceolate, abaxially densely ferruginous-hirsute, margins densely ferruginous-hirsute. Corolla 7–10 mm long, pink, lobes linear-oblong to oblanceolate, abaxially glabrous or with a small tuft of sericeous pubescence near apex, connate basally for 2–3 mm and adnate to the filament tube for 4–5 mm at base. Stamens ± 4-seriate; filaments connate basally for 6–8 mm, distinct portions 1.5–2 mm long, 0.5–0.75 mm wide. Disk white-pilose. Style 8–10 mm long, pilose basally; stigma conspicuously but irregularly lobed. Fruits 1.8–2.3 cm long, 0.9–1.2 cm diam., cylindrical, ferruginous-hirsute, not seen in cross-section, disk convex.

Chiapas endemic: Pine-Oak Forest; uncommon in Sierra Madre; 2100–2255 m. CHIAPAS COLLECTIONS: *Sta 359* (MEXU); *65734*; *65754*; *66007*.

The only known collections of this species are from the northern slope of Volcán Tacaná, in Chiapas, but it likely occurs in adjacent Guatemala.

Symplocos tacanensis is similar to *S. excelsa* in that both have large fruits and pubescent sepals. Nevertheless *S. tacanansis* differs from the latter species in its glabrous petals, and *S. tacanensis* can be distinguished from all other Chiapan species (including *S. excelsa*) by the dense ferruginous-hirsute pubescence on its stems, abaxial leaf surfaces, and inflorescences.

Taxa of Uncertain Status

Symplocos pycnantha Hemsl., Biol. Cent.-Amer., Bot. 2:302. 1881.—SYNTYPES: México, Chiapas, without locality, *J. Linden 359* (K?); Oaxaca, without locality, *C. Jurgensen 892* (K?). The status of this name is uncertain pending revision of the type material, which, based on its provenence, may be heterogeneous.

Symplocos hartwegii A. DC. var. *opaca* Brand, Bull. Herb. Boissier ser. 2, 6:749. 1906.—SYNTYPES: Guatemala, without locality, *H. Heyde & D. Lux 3011* (F!, MO!, NY!, US!). The type material of this variety consists of discordant elements: the specimen at F corresponds to *S. hartwegii*, the specimen at MO corresponds to *S. matudae*, and the specimens at NY and US are both mixed collections of these two species. The application of this name will need to be resolved through lectotypification.

Appendix 1. *Collector's names and abbreviations*

Chiapan collections are cited alphabetically by collectors' last names (except Breedlove) and in ascending numerical order for multiple collection numbers of one collector. Breedlove's collections are cited at ends of specimen lists and are cited by his number only. In most instances only the first collector's name is utilized for collections made by more than one individual (e.g., *Chamé & Gutiérrez 476* under *Cham 476* and *Breedlove & Almeda 47767* under *47767*). Standard designations for herbaria are used (Holmgren, P.K. et al. 1990. Index Herbariorum, ed. 8. New York Botanical Garden, Bronx). First sets of collections made by D.E. Breedlove are housed at the California Academy of Sciences (either CAS or DS); his duplicates will be found in other herbaria as well, including: DUKE, ENCB, F, K, LL, MEXU, MICH, MO, NY, and US. The following list includes all collectors cited so far in the *Flora of Chiapas* series.

Andrie, [R.F?]	(Ad)
Alava, R.	(A)
Alexander, E.J.	(Alex)
Altamirano, F.	(Al)
Anderle, R.F.	(An)
Anderson, W.R.	(And)
Arcos V., R.	(AV)
Armor, A.	(Arm)
Arrequín S., M.L.	(Ar)
Avendaño, S.	(Av)
Baldwin, J.T., Jr.	(Ba)
Balough, P.	(Bal)
Bamps, P.	(Bam)
Barrie, F.	(Bar)
Bauml, J.	(Bau)
Becerra, M.E	(Be)
Becker, K.	(Beck)
Berger, B.	(Ber)
Beutelspachen, C.R.	(Bt)
Bodegas, R.	(Bod)
Boege, W.	(Boe)
Bossé, G.	(Bo)
Brenan, J.	(Bre)
Brett, J.	(Br)
Brooks, R.W.	(Brooks)
Brunken, J. & C. Perino	(B&P)
Burnham, R.	(Bu)
Cabrera C., T.	(TCC)
Cabrera, E.	(Cb)
Calvert, D.	(Cv)
Calzada, J.I.	(Cz)
Carlson, M.	(MC)
Case, P.	(Case)
Castillo, C., G.	(Cast)
Cedillo T., R.	(Ce)
Chamé, A.	(Cham)
Chamé, A. & A. Luna	(C&L)
Chavelas P., J.	(Ch)
Chemsaak, J.A.	(Chm)
Chittenden, E.M.	(Chit)
Clarke, O.F.	(C)
Cloud, J.	(Cl)
Collins, G.N.	(Collins)
Collins, G.N. & C.B. Doyle	(C&D)
Conrad, J.	(Con)
Cowan, C.	(Co)
Croat, T.	(Cro)
Cronquist, A.	(Crq)
Cruden, R.	(Cru)
Daniel, T.F.	(Dan)
D'Arcy, W.G.	(D'A)
Davidse, G.	(Da)
Davis, L.	(Dav)
Delgado S., A.	(De)
Denton, M.	(Den)
Diboll, N.	(Di)
Dillon, M.O.	(Dillon)
Dressler, R.L.	(Dr)
Dreyer, D.	(DD)
Dunn, D.	(Dunn)
Enriquez, ?	(En)
Espejo, A.	(Es)
Farrera S., O.	(Fa)
Feddema, C.	(Fed)
Fernández N., R.	(Fe)
Fisher, G.L.	(Fi)
Fryxell, P.A.	(F)
Funk, V.A.	(Funk)
García F., J.	(Ga)
García P., J.	(Gar)
Gereau, R.E.	(Ger)
Ghiesbreght, A.B.	(G)
Gilly, C.L. & E. Hernández X.	(G&H)
Gittens, B.T.	(Gi)

Gliessman, S.R.	(Glie)
Goldman, E.A.	(Go)
Gómez G., M.	(MGG)
Gómez L., M.	(GL)
Gómez-Pompa, A.	(G-P)
Gómez S., F.	(GS)
González-Espinosa, M.	(GE)
González G., L.	(GG)
González-Quintero, L.	(G-Q)
González-Villareal, L.M.	(G-V)
Green, H.T. (= H.T.G.)	(HTG)
Hale, M. & T. Soderstrom	(H&S)
Hammel, B.	(Ham)
Hampshire, R.	(Hamp)
Hansen, B.	(Han)
Hardison, L.	(Hd)
Harriman, N.	(Ha)
Hartman, R.L. & V.A. Funk	(H&F)
Heath, M.	(He)
Hernández G., H.	(HG)
Hernández L., J.	(HL)
Hernández M., R.	(HM)
Hernández X., E.	(X)
Hernández X., E. & A.J. Sharp	(X&S)
Hilerio H., L.	(Hi)
Holmes, W.C.	(Hol)
Hoover, W.B.	(Hoov)
Howard, M.J.	(Ho)
Huft, M.J.	(Hu)
Ishiki, M.	(Is)
Jack, A.	(Jack)
Jackson, R.C.	(Jks)
Jezepczuk, S.V.	(J)
Johnson, C.	(Jo)
Johnston, M.C.	(Jt)
Jones, R.	(Jon)
Juzepczuk, S.V.	(J)
Kelly, L.	(Ke)
Kim, K.	(Kim)
King, R.M.	(RMK)
Kliks, M.	(Kl)
Koch, S.D.	(K)
Krauss, [N.L.H.?]	(Kr)
LaDuke, J.	(LaD)
Landon, K.	(Lan)
Landrum, L.	(LL)
Langman, I.K.	(Lm)
LaSalle, J.	(Las)
Lathrop, E.W.	(EL)
Laughlin, R.M.	(La)
Lavin, M.	(Lav)
LeDoux, [D.G?]	(LeD)
Linden, J.J.	(Li)
Little, E. & A.J. Sharp	(L&S)
López, E.	(Lop)
López M., J.	(LM)
López P., J.	(Lo)
Luckow, M.	(Luc)
Luna-Gómez, A.	(LG)
Lundell, C.L.	(Lu)
MacDougall, T.	(Mc)
Magaña, M.	(Mag)
Marcks & Marcks	(M&M)
Marin, R.A.	(Ma)
Martínez-Ico, M.	(MI)
Martínez S., E.	(Mz)
Matuda, E.	(EM)
Maxwell, R.H.	(Max)
Mayo, S.	(My)
McDade, L.	(McD)
Meave, J.	(Mv)
Mejía E., & A. Luna-Gómez	(M&L)
Melchert, T.	(Mel)
Mell, C.D.	(Me)
Mendez T., A. (see Ton, A.S.)	
Meza A., R.	(Mez)
Mickel, J.T.	(JTM)
Miller, J.S.	(Mil)
Miranda, F.	(Mi)
Moldenke, H.	(Mol)
Montes de Oca, R.	(Mt)
Morley, T.	(Mo)
Moore, H.E.	(Mr)
Münch, G.	(GM)
Narave F., H.	(Na)
Nee, M.	(Nee)
Neff, J.L.	(Neff)
Neill, D.	(Ne)
Nelson, E.W.	(N)
Oberg, R.	(O)
Ochoa G., S.	(Och)
Palacios E., E.	(Pa)
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Pérez G., M.	(PG)
Pérez H., F.	(PH)
Pérez L., J.M.	(PL)
Pérez M., A.	(PM)
Perino, C.H.	(Per)
Perino & Perino	(P&P)
Prather, A.	(Prat)
Purpus, C.A.	(P)
Quarles van Ufford, L.	(QVU)
Quiroga M., R.	(Qu)
Ramírez M., N.	(RM)

Raven, P.H. & D.E. Breedlove	(R&B)
Reeder, J.R. & C.G. Reeder	(R&R)
Reyes G., A.	(Rey)
Reznicek, A.	(Re)
Riba, R.	(Ri)
Rodriguez G., G.	(RG)
Rodriguez J., C.	(RJ)
Roe, K., E. Roe & S. Mori	(R&R&M)
Roseman, R.R.	(Ros)
Rovirosa, J.N.	(R)
Ruiz D., M. de J.	(Ruiz)
Rzedowski, J.	(Rz)
Sánchez L., V.M.	(SL)
Sánchez M., H.	(San)
Sanders, R.	(RS)
Sántiz C., E.	(SC)
Sántiz R., C.	(SR)
Saunders, D.C.	(Sau)
Saunders, J.G.	(Sa)
Schubert, B.	(Sch)
Seler, G.E.	(Se)
Seler, C. & E. Seler	(S&S)
Sharp, A.J.	(S)
Sinaca C., S.	(Si)
Siegler, D.	(Sieg)
Simpson, B.	(Sim)
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Sohns, E.R.	(So)
Solis E., J.	(Sol)
Sørensen, M.	(Sør)
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Sousa, M.	(Sou)
Spellenberg, R.	(Spe)
Spellman et al.	(Sp)
Spooner, D.M.	(Spo)
Stafford, P.	(Sta)
Stall, ?	(Stall)
Starr, G.	(St)
Stevens, W.D.	(Ste)
Stone, D.E. & C.R. Broome	(S&B)
Stuessy, T.F.	(Stu)
Sundberg, S.	(Sund)
Sutherland, S.	(Su)
Téllez, O.	(Te)
Tenorio L., P.	(Ten)
Thomas, W.	(Th)
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Ton, A.S.	(T)
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Ventura A., F.	(Ven)
Vera S., J.	(VS)
Verity, D.S.	(Ver)
Villaseñor R., J.L.	(Vi)
Voorhies, B.	(BV)
Voorhies & Sánchez	(V&S)
Walker, T.	(Wa)
Weatherwax, P.	(W)
Webster, G.L.	(We)
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